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1937

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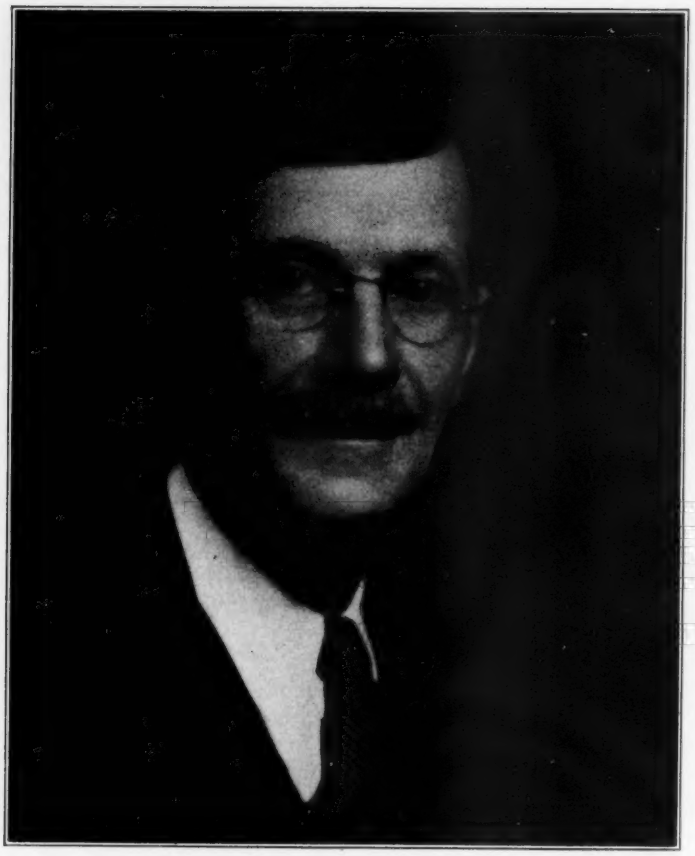

HARRY M. SEMANS, D.D.S., Columbus, Ohio
President of the American Association of Dental Schools

UNIV. OF MICH.

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THE JOURNAL *of the*
AMERICAN DENTAL ASSOCIATION
and THE DENTAL COSMOS

Vol. 24 JULY 1937 No. 7

RETENTION OF LOWER DENTURES

By ALEXANDER H. PATERSON, D.D.S., F.A.C.D., Baltimore, Md.

BECAUSE of the enormous amount of research that has been carried on in attempting to establish a system or method of denture construction that would assure the utmost success in the retention of lower dentures and because this investigation has not produced a method by which lower denture retention can be guaranteed, a discussion of the many factors involved in producing the desired results has been inspired. It is a recognized fact that these investigations have added much to our knowledge of the subject and have stimulated the development of methods of procedure that have resulted in marvelous improvements, increasing tremendously the amount of procurable retention. It is recognized also that much misrepresentation has grown out of the advancements made. Enthusiasm of some of the investigators for an idea, without sufficient concern for the fundamental principles of denture retention, has resulted in great disappointment to the profession. Too much attention has, in many instances, been given to materials and their manipulation, without sufficient study of the basic essentials. It is not the purpose of this presentation to add another technic to the long list already in existence; the intention is only to point out the fundamentals that must be recognized and utilized in order to develop the greatest amount of retention that may be obtained.

(Read before the Section on Full Dentures at the Seventy-Second Annual Midwinter Clinic of the Chicago Dental Society, February 16, 1937.)

PHYSICAL FORCES OF RETENTION

The physical forces utilized in lower denture retention are adhesion and gravity. Adhesion is defined as the molecular attraction which holds together the surfaces of bodies or substances in contact. The amount of adhesion in a given case will be in proportion to the area covered by the denture and the correctness of its adaptation. The greater the contact surface, the greater the adhesion and resistance to force. The resistance offered to

any force tending to dislodge a denture through the contact of the denture surface against the soft tissue may be regarded as frictional resistance. The adhesion of the denture, therefore, under all conditions, will be maintained by the amount of frictional resistance present.

Gravity, defined as the force that draws all bodies toward the center of the earth, is not a factor of any great importance in lower denture retention. It naturally is regarded as a favorable factor, but its value has been much exaggerated. Weight in the construction of the appliance is not desirable; it is attended always with most unsatisfactory results. Dependence is placed mostly in the adhesive qualities

Fig. 1.—Model illustrating how base outline is established.

of the dentures and the power of frictional resistance.

AVAILABLE FLAT SURFACE

In order to obtain sufficient flat surface to produce the greatest amount of adhesion and frictional resistance, it is necessary to study the oral cavity in detail. The peripheral border of the base of the proposed denture must be accurately established. It should include all of the area possible without impinging too much on the surrounding soft tissues. The system employed in making this estimate follows an orderly procedure designed to obtain this exact information.

ESTABLISHING THE BASE OUTLINE

Posterior to the location of the last molar tooth, directly in line with the crest of the alveolar ridge and well up on the movable soft pad of tissue usually found in that region, a point of beginning is located (Fig. 1, A). From this point, an imaginary line is extended lingually forward and downward to a point near the posterior attachment of the mylohyoideus muscle to the mylohyoid ridge, or possibly a little beyond, if the tone of the muscle will permit (Fig. 1, B). Rounding this point, the line is continued forward at an angle varying in degree to the line just described, and following the full extent

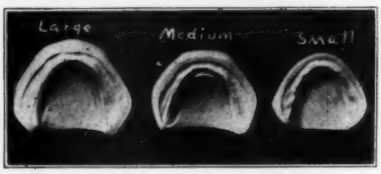

Fig. 2.—Models illustrating how size affects retention.

of the mylohyoideus attachment to the frenum linguae at the symphysis of the jaw (Fig. 1, C).

Again, from the point of beginning (Fig. 1, A), a line is extended buccally forward and downward, with a greater inclination forward than the line extended lingually from the point of beginning. The line follows the fold of mucous membrane as it leaves the surface of the bone and passes up into the cheek. This tissue fold is a natural sequence, owing to the arrangement of the tissues covering the angle of the jaw. The extent of the tissue attachment varies, but it is usually from a half to an inch or more in length. At the terminus of this fold, a point is estab-

lished (Fig. 1, F), and from it the line is continued forward, upward and inward, again following the fold of the mucous membrane along the horizontal portion of the mandible to the attachment of the buccinator muscle on the alveolar process (Fig. 1, E). Leaving this point, the line usually takes a sharp decline and continues on to the center of the jaw with little or no variation (Fig. 1, D).

The outline both lingually and buccally follows the same general direction as the crest of the alveolar ridge, and is influenced in its regularity and width throughout its whole extent by resorption of the process, and by the position of the surrounding soft tissues. The area included within the established outline, to be ideal as a base surface, must possess, in addition to its width, a firm and resistant covering of mucous membrane, and the surrounding soft tissues that form its borders must be sufficiently lax to be a negative factor in dislodgment. The whole base surface must be bathed with a normal flow and thickness of saliva to form the seal that creates the strongest adhesion and frictional resistance.

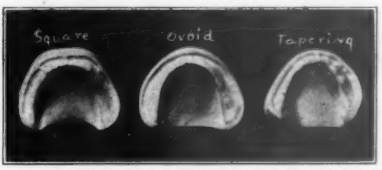

Fig. 3.—Models illustrating how shape of jaw affects retention.

NATURAL CHARACTERISTICS THAT PROMOTE OR HINDER RETENTION

In addition to the available flat surface in the mouth, there are other natural characteristics that promote or hinder retention, such as the size of the jaw, the shape of the jaw, the form of the ridges, and the relationship of the jaws. If all of these characteristics are not ideal, retention will be difficult to obtain. In other words, the more nearly ideal the natural characteristics and the greater the available flat surface, the greater the possibilities of developing a denture that will have the utmost adhesive and frictional resistance qualities. When the mouth lacks the natural characteristics and the necessary flat surface that assure maximum retention, stability will be in proportion to the quality of these essentials, and the power of adhesion and frictional resistance will be in the same ratio.

SIZE OF JAW

An average jaw is the best size for retention. Extremes in either direction, that is, a very large jaw or a very small jaw, introduce technical difficulties. The intricacies involved in manipulating the materials, in either case, make perfect adaptation difficult to obtain. When perfect adaptation has not been properly established, adhesion and frictional resistance will be greatly lessened. Neither of these physical forces will function with sufficient power to maintain retention, and the degree of stability will vary in accordance with the strength of the adhesion established (Fig. 2).

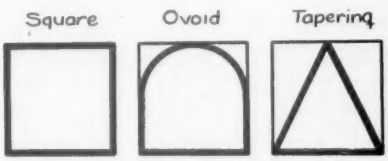

Fig. 4.—Areal differences due to form.

SHAPE OF JAW

The jaw presents three types as to form: the square, the ovoid and the tapering (Fig. 3). Form is a factor in retention because the surface varies with the form (Fig. 4). The square type affords

the greatest degree of retention. There are more units of space contained within its base outline than in either the ovoid or the tapering types. The square jaw, because of its formation, offers the greatest resistance to force. Next to the square type, the ovoid type jaw contains the most units of space within its base outline, offering, because of its formation, the next greatest resistance to force. The tapering jaw contains the smallest number of units of space within its base outline, and, therefore, offers the least amount of resistance to force (Fig. 5).

SHAPE OF RIDGE

Like the jaw, the ridge presents three types of formation: the square, the ovoid and the tapering. In each of these types,

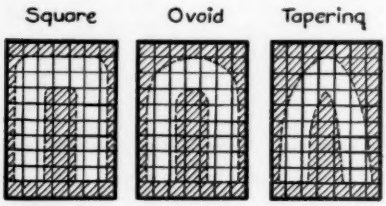

Fig. 5.—Differences of units of space in three types.

there is a difference in degree of retention because of differences in ridge form. The square-type ridge presents the best possible situation for retention. The square formation and height of the ridge act as a lock to retain the denture, and present the greatest amount of flat surface, the most valuable factor in producing adhesion and frictional resistance. Retention in the square-type ridge is easily obtained, and stability may be established without any particular effort or systematic impression technic. The form of the ridge assures enough natural retention to retain the denture in spite of a disregard for the fundamentals usually considered. As resorption occurs and the height of the ridge gradually decreases, the natural lock correspondingly diminishes. As resorption continues, all of the mechanical lock that the ridge supplied is lost and maximum retention is now difficult to obtain. While attention to the fundamentals may be slighted to some extent when the ridge is full, attention to the fundamentals now becomes increasingly important, and every factor that will assist in compensating for the loss of the ridge which supplies the lock must be used with the utmost efficiency.

The ovoid ridge does not offer the same natural formation to produce retention as the square-type ridge. There is a considerable difference in the amount of available flat surface, and its roundness decreases tremendously the amount of mechanical lock. Retention is harder to obtain in the ovoid type and more care must be exercised in the manipulation of the materials and in the technic employed. The rounded formation of the ridge demands greater attention to technical details because, as in the square-type ridge, the difficulties increase as resorption progresses.

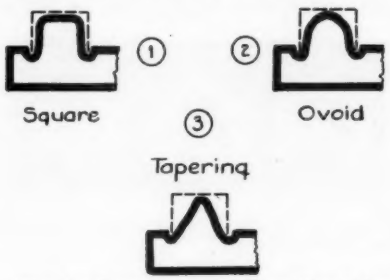

Fig. 6.—Cross-section of ridges illustrating ideal ridge for retention in each type.

The tapering type ridge is the most unfavorable for retention. It presents a minimum of flat surface and is almost devoid of any mechanical lock. Retention

in this type is extremely difficult to obtain and the utmost attention must be given to the manipulation of the materials and to the technical details. Stability in this type never equals the stability obtained in either the square or the ovoid types. It lacks all of the natural characteristics that aid in retention, and the same firmness of seating is not expected. Because of its shape, it does not offer the same resistance to stress as the square and the ovoid types. In the square type, stress is directed at right angles to a horizontal plane; which tends to stabilize the denture at all times. In the ovoid type, stress is not directed at right angles to a horizontal plane, but nearly so, and a reasonable degree of stability is maintained. In the tapering type, stress is not directed at right angles to any horizontal plane and stability is always an uncertain quantity.

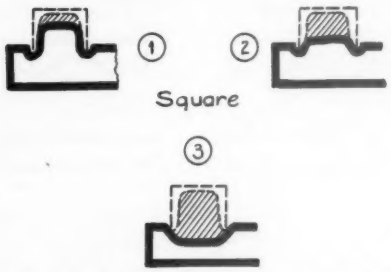

Fig. 7.—Cross-section of square-type ridge illustrating how resorption reduces retentive possibilities.

The three types selected to represent the ideal in each one of the formations presented illustrate how the difference in shape affects retention (Fig. 6). They illustrate how resorption decreases the elevation and changes the form of all three. They picture the situation when the ridge has been reduced halfway, when it has been reduced to the base of the original ridge and when it has been reduced below the level of the original ridge (Figs. 7, 8 and 9). The cross-sections also show how the ridge form is maintained during the process of resorption, even when it has reached the extreme point in the reverse direction. Each alteration of the ridge form introduces features that make retention progressively difficult.

RELATIONSHIP OF JAWS

When the vertical relationship of the jaws is normal and all other characteristics that aid in retention are ideal, stability will be present in the greatest degree because of the height of the ridge and its form and available flat surface. The ideal ridge will provide enough mechanical lock to resist stress without dislodgment.

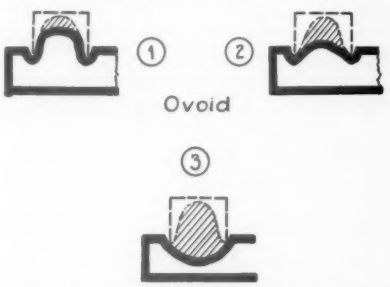

Fig. 8.—Cross-section of ovoid-type ridge illustrating how resorption reduces retentive possibilities.

Leverage, always a disturbing element, is not a consideration when the vertical relationship is normal. Neither is balanced occlusion so necessary as an aid. The mechanical lock supplied by the ridge will resist stress in spite of the leverage present or the absence of good construction. (Fig. 10, A). When natural retention is altered by resorption, a proportion of the mechanical lock is removed, vertical relationship is increased and it becomes more necessary to be particular about establishing balanced occlusion. When the vertical relationship is extreme,

the mechanical lock that the ridge supplies is entirely obliterated, and leverage becomes a factor of much concern (Fig. 10, B). Dependence in the maintenance of retention is then placed altogether on the amount of available flat surface and frictional resistance present. Balanced occlusion becomes the most important factor in the protection of these two primary physical conditions.

SUPPLEMENTARY AID

Only under the most favorable circumstances can retention of lower dentures be expected without the aid of the patient. There are cases, however, in which there is sufficient natural retention to hold a lower denture in position without this assistance. If enough of the natural characteristics that assure retention are present, a lock will be formed, and this feature, along with the physical forces, will resist dislodgment under many conditions of abuse. When these natural characteristics are not present and sufficient lock is lacking to hold the denture in position mechanically, it requires, in addition to the utilization of the other stabilizing essentials, all the help possible from the patient.

The tendency on the part of the patient, when the lower denture is placed in the mouth, is to expel it. The muscles of the tongue, lips and cheeks are unaccustomed to the feel of the artificial appliance and their normal function is temporarily upset. During this period when these muscular structures are not fully in function, any stability that the denture has will depend entirely on the quality of retention developed. As the muscles of the tongue, lips and cheeks become accustomed to the feel of the denture in the mouth, their function is gradually restored and they become a very important factor in assisting the denture to stay in position. As the initial adhesion begins to lessen, their importance as a holding factor greatly increases. When an insufficient degree of retention is present in the beginning, the only hope to sustain the denture rests in these muscular structures. They will, after a period of time, function in this capacity. The time for this to take place varies with the individual patient. It is a long tedious process in some cases and requires much perseverance. Nervous patients, especially those depressed by fatigue, sepsis or malnutrition subsequent to the removal of the teeth, or by worry over their appearance, require a longer period for adjustment than do those better poised.

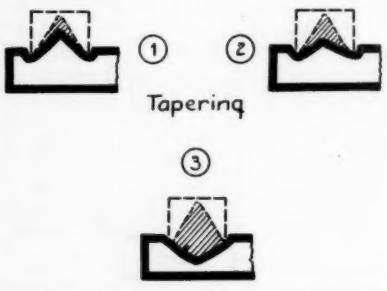

Fig. 9.—Cross-section of tapering type ridge illustrating how resorption reduces retentive possibilities.

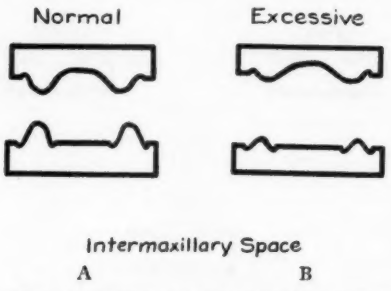

Fig. 10.—Drawing illustrating how normal and excessive relationships affect retention by the introduction of problems in leverage.

When extensive extraction and replacement of teeth, especially by dentures, is necessary, extremely grave changes in the features of the mouth take place. New pressure points develop and the leverage relations of the lower jaw are changed. A whole new system of sensations pass to the brain, and a new set of motor impulses must be developed before the masticatory movements can again become unconscious and efficient.

The motor machinery of the body, the muscles and tendons, possesses a double innervation. Nerves pass from the central nervous system to these structures (motor nerves), and nerves arise in these structures and pass to the brain (sensory nerves). These sensory nerves carry sensations of differences in tension and pressure, which, in large part, make up our consciousness of muscular movement and position.

In learning any specific performance, a complex reflex arc is established, of which these nerves constitute, in large measure, the sensory arm. Such a complex reflex cares for the activities of mastication. In a short time, however, readjustment has been effected, and mastication is again, for the most part, automatic; the patient has become habituated to the changed conditions in his own mouth.

CONCLUSION

The object of this presentation is to emphasize the necessity of a thorough understanding of the fundamentals upon which retention is established, and to try to clear up by an orderly discussion of the same fundamentals any misunderstanding that has arisen in regard to abnormal claims. The endeavor has been to point out the advantages and disadvantages of certain features that aid in or hinder retention so that a proper estimate of its possibilities may be made.

The profession has adopted and has made an honest effort to put into practice all of the various methods that have been introduced. It has been forced to discard consecutively many of these methods, because the advocates have based their beliefs on materials and manipulation without a proper regard for the basic principles involved. It is evident, when all of the adverse conditions are considered, such as an insufficiency of flat surface, the presence of a poor mucous covering, an abnormal flow of saliva, an unfavorable size and shape of the jaw, absence of any ridge lock, extreme vertical, lateral or protrusive relationships and a lack of response on the part of the patient, why maximum retention is not always possible.

When the mouth has all the ideal features, retention will be obtained in the highest degree, but when the mouth has not these features, retention will be obtained in a correspondingly lesser degree. The same rule applies to the skilled and to the unskilled operator: either can make dentures retentive only to the extent to which the conditions of the mouth will permit.

Medical Arts Building.

THE NEWER PLANS FOR COMMUNITY DENTISTRY

By ALFRED WALKER, D.D.S., New York City

COMMUNITY health service includes a variety of activities which aim to improve the health of the individual primarily, and ultimately that of the community as a whole. Such activities may vary from simple educational programs to as nearly complete a service as financial and physical facilities and scientific knowledge will permit.

The responsibility of the community for the health of the individual has long been recognized and accepted. This is exemplified in boards of health, community maintained hospitals and the many privately conducted voluntary health organizations. The activities of boards of health were at first limited to matters pertaining to sanitation and vital statistics, and to regulations related to contagious and transmissible diseases. It is well to note also that boards of health are endowed with police powers which enable them to compel the individual to comply with such regulations as are considered necessary for public health. In recent years, the scope of public health has been extended to include preventive services such as the administration of vaccines and antitoxins, notably the smallpox and diphtheria preventives. Not the least of the responsibilities of community health service are those concerned with disseminating information relating to health conservation.

In the early days, hospitals were, for the most part, either general or contagious disease institutions. Municipalities, counties and states have, over a long period of years, been enlarging and extending their hospital facilities until today there exist throughout the land, county and state tuberculosis sanatoriums and hospitals. These tax-financed institutions are caring for a large majority of hospitalized persons suffering from tuberculosis and mental diseases. I mention these facts not as an argument for or against the extension of government responsibility for the care of the sick, but merely to show the trend in this direction.

For many years, organized groups and individuals throughout the country have been endeavoring to bring about, both in Congress and in the several state legislatures, the enactment of laws designed to provide an even more widespread distribution of health service. During the past decade, these efforts have become increasingly persistent, the proponents maintaining that present methods of distribution do not provide needed service for indigents and for those in the low income brackets.

In the beginning, the numerous groups engaged in promoting these measures were acting independently of each other and without the cohesiveness necessary to make appreciable headway. There was no consensus of opinion as to which of the many plans was the most workable; on the contrary, there existed a wide divergence of ideas on the subject. Having a common objective, however, it was inevitable that these groups should eventually consolidate their forces, agree on

(Read at the Annual Meeting of the Dental Society of the State of New York, New York City, May 4, 1937.)

a program and support it in a united effort.

I do not believe that any one who has given serious attention to the situation, whether he be for or against the principle of providing health service for all of the people, is at all doubtful that the adoption of some plan which will make it possible to provide adequate health service to greater numbers of the population will sooner or later be effected. While there is at present no common understanding as to the exact meaning of "adequate service," the term is generally accepted to include the administration of acceptable preventive measures in order to maintain persons in a state of health, and the provision of such medical, hospital and nursing care as is necessary to restore sick persons to health and usefulness.

An adequate program for public health service, whether it be state, socialized or insurance, and whether it be on a national, state or local scale, must, if it is to be adequate, include dental treatment.

While on its face this may appear to be a simple statement, its implications are more complex than may at first be apparent. Time and again, well-intentioned programs have failed because the obvious was overlooked in their planning.

Early in 1934, it became apparent to the members of the Committee on Community Dental Service of the New York Tuberculosis and Health Association that many of those who were taking leading and active parts in promoting various schemes for providing a more widespread distribution of health service, which included dental service, were wofully ignorant of the deeper implications involved in the actual administration of dental service. Sensing the damage to the public and the profession which would, under such circumstances, follow any attempt to include dentistry in the programs then under consideration, the committee undertook to gather and publish some facts in this connection. In February, 1935, the information so gathered was published in a booklet under the title "Health Dentistry for the Community." Publication was made possible by a grant from the Julius Rosenwald Fund. In the foreword, the following is of particular interest at this point:

> The committee has been led to conduct this study partly because, in surveys made in the past covering the health of the people, there has been a singular omission of detailed information regarding dental conditions and a remarkable lack of appreciation of problems involved in providing dental health service for the public. It is to correct this omission that this report was prepared, and it is submitted as supplement to, and not as a criticism of, other studies.

The gathering and interpretation of the data presented and the comment relating thereto were motivated not by a desire to promote any specific panacea, but rather to supply needed information for community-wide planning. The primary objectives of this study can be expressed as follows:

1. To demonstrate that dental care is a necessary part of any general health program.
2. To furnish reliable figures showing the incidence of dental disease in the population at various ages.
3. To set forth available information as to practical and effective means for gaining control of dental disease as economically and rapidly as possible.
4. To demonstrate that under present conditions the maintenance of oral health can be assured only through periodic dental care, and financing of this care must be on the basis of the periodicity of need for the service.

The study did not undertake to offer or to sponsor any plan of so-called socialized dentistry. It took no stand either

for or against clinics. It aimed merely to furnish information as to what had been and was being done to provide dental service for those in the community for whose care no provision is made in the customary private practice of dentistry.

You will understand from the foregoing that the committee was not interested in promoting any one plan. It did take cognizance of a definite trend, not merely local, but also national in scope. It was thoughts such as these that prompted the publication of "Health Dentistry for the Community."

Dentists are well aware of the problems involved in administering a complete dental service even for those who can meet the cost. When we contemplate the provision of adequate service for the low income groups and more than an emergency service for indigents, the problem becomes one of the first magnitude.

The time has long since passed when the professional responsibility of the dentist was concerned with the routine of the private office only. Since dental service is now an established part of health service, we must accept the broader responsibilities that go with our calling.

The aim of the dental profession is well expressed in "Health Dentistry for the Community," as follows:

> The aim of the dental profession, as it surveys its responsibilities to the community, is that every one shall receive complete dental care. Dentists urge this as a matter of economy as well as for improved health in the community, inasmuch as reduction in time lost from school during childhood and from industry in later life is a result which may reasonably be expected to follow the institution of such a program.

Complete dental care is defined as the provision of such preventive and restorative measures as may be needed to maintain for each individual throughout life a healthy mouth and a fully functioning set of teeth. While this is the ideal aim, it must of course be remembered that, for a large percentage of the present adult population, this ideal is not attainable because of previous encroachments of dental disease. For instance, dental care may be conservative for adults whose mouths have not already suffered considerable damage, but for adults in whom dental care has been completely neglected, it must consist largely of such radical measures as the removal of non-savable teeth and the insertion of suitable dentures (artificial teeth). The dental treatment needed for each of these groups may be complex and costly. On the other hand, the conservative care of children's mouths, if started sufficiently early, presents the simplest and most economical means of maintaining the health of the mouth throughout life.

THREE CLASSES REQUIRING DENTAL SERVICE

In "Health Dentistry for the Community," it is recognized that "in order to develop from the present haphazard distribution of dentistry a program to provide every one with complete dental care, a plan must be devised to meet the needs of three distinct classes in the population: (a) all children; (b) those adults who are fortunate enough to have retained nearly all their teeth, and in such condition that preventive or conservative dentistry can satisfactorily be applied; and (c) those adults whose teeth have been so badly damaged by previous dental disease that it is now necessary to provide radical operations (multiple extractions) and artificial restorations." In past studies such as those conducted by the Committee on the Costs of Medical Care and the Committee on the Study of Dental Practice of the American Dental Association, no distinctions along these lines were made. It is precisely at this point

that all previous plans and surveys leave the realm of the practical and enter the field of conjecture. It is extremely important that the afore-mentioned differentiations be recognized and taken into consideration, since the cost of caring for each of the three classes varies widely and requires entirely different financial planning.

In explanation of the statement just made, attention is called to the fact that dental care, if started early enough in the life of the child, can be maintained throughout the average life at a comparatively low annual fee.

The provision of dental care for adults falls into two subdivisions. Group I includes those who have in the past received little dental care and only at irregular intervals, and who must presently be provided with periodic dental attention, including prophylaxis, fillings, inlays, partial dentures and bridgework. Dental care for this group, even at nominal fees, will be found to amount to a sizable sum from year to year. Group II includes those adults who, after submitting themselves to a series of extractions, may be provided with full dentures. As a rule, this group will require little additional dental attention beyond denture repairs and infrequent replacements. Consequently, after a rather high initial expense, the annual expense thereafter will be comparatively low.

In view of these facts, it should not be at all difficult for us to agree that plans for public dental care which do not take cognizance of the types of dental patients to be served are based on deficient premises and will prove impractical and inequitable for public and profession alike.

The existing means for providing dental care for the community have been analyzed by various bodies from time to time, including such agencies as the Committee on the Costs of Medical Care and the Committee on the Study of Dental Practice of the American Dental Association. These studies noted the number of dental practitioners in the United States and also their distribution in private practice, dental clinics, hospital services, etc. In 1929, there were in the United States 56,800 dentists in private practice and 5,600 engaged in clinics, hospitals and dental colleges. The percentage of the population receiving dental care has not been determined absolutely, but figures are available on the expenditures therefor. The average annual expenditure for dental care is extremely low, and but a small part of the population (probably less than 25 per cent) receives systematic and sufficient dental care. It is thus indicated that a large proportion of the population receives little if any dental care; and it may safely be inferred that for this large group such dental care as is given consists chiefly of service for the relief of pain. Attention is drawn to the fact that, since pain does not invariably and constantly accompany dental infection, a dental service which consists only of extracting aching teeth cannot be called a complete health service and is still less to be considered a satisfactory dental service.

In the report of the Committee on the Costs of Medical Care as it relates and refers to dental care, there is a singular assumption that dental care is like medical care in the lack of periodicity of need for service and also in the time involved in the actual treatment of the patient and the cost per visit.

PRESCHOOL DENTAL CARE

There is another striking omission in the report of the Committee on the Costs of Medical Care relating to the problem of dental service for children. We as dentists recognize this as a serious shortcoming. In the first place, those familiar

with conditions prevalent in the mouths of children today know that dental disease—much of it serious in character and consequence—is rampant in children's mouths, even those below six years of age, the age for entering school, as has been shown time and again in the reports of the Guggenheim Dental Clinic made by John Oppie McCall. This condition constitutes a serious menace to the health of the child population and in many cases lays the foundation for various other ailments which manifest themselves later in life. In the second place, professional experience indicates that effective dental care for the adult cannot be provided economically if the teeth have been neglected during childhood. Premature extraction of deciduous teeth and the frequently needed extraction of neglected first permanent molars, as portrayed in recent studies by J. A. Salzmann at the Dental Service of the New York City Vocational Schools, bring about mouth conditions which foster an increased incidence of dental caries, malocclusion and other dental diseases and make conservative dentistry both difficult of execution and almost prohibitive in expense for the low earning groups.

It has been found in the Murry and Leonie Guggenheim Dental Clinic, New York City, where over 9,000 children are treated annually, that not only does caries begin to manifest itself at the age of two years in more than 50 per cent of the cases examined, but also the incidence of decay, already dangerously high at this age, increases rapidly up to and beyond the age of six. This condition suggests not only that it is important to begin systematic dental care not later than the age of two, but also that some agency must be developed through which all preschool children may be brought under observation of the dentist. This thought is inserted because both physicians and dentists commonly consider six years, or the age for entering school, a suitable time to begin systematic health supervision. This age may have been thus approved because of the convenience of the public school system as a medium through which health inspection and supervision can be provided. It seems inevitable that the revelations of recent dental investigations will force the development of a new activity in either the education or the health departments of the cities to reach the entire preschool population with preventive dental care, if preventive dentistry is to be economically and successfully practised for the child.

Another aspect of dental service for preschool and school children is that related to the costs of their education. Available data indicate that much of the loss of time and retardation of school children is chargeable to dental disease, both directly and indirectly, as it affects the general health of the child. To eliminate such disease by prevention or early correction would unquestionably materially lower per capita education costs. Such an economic gain might well be utilized in financing a universal dental program for children.

The relations known to exist between dental infection and the various systemic diseases, and between dental diseases and digestive disorders and impaired nutrition, etc., emphasize the important part which dental care should play in the community health program. Looking at the problem from this standpoint, the provision of community dental care should be regarded not only as a fundamental health measure, but also as the foundation stone for economical health administration.

It has been stated that no one in need of medical service is deprived of it because of inability to pay for it. This is essentially true. However, the dental situa-

tion is decidedly different, for every dentist knows that there are millions of people throughout the country who are in dire need of dental service but cannot obtain it, since they have not the means to pay for it. The dentist is not in a position to bear the expense. The only alternative left to these people is to do without needed dental care.

The many persons who are well able to meet the expense of dental service and fail to provide it either for themselves or for their dependants present another problem, one that can effectively be met by educational measures. The burden of dental costs falls especially heavy on that class of the population whose income arbitrarily places them somewhat above the indigent level, but the nature and the extent of whose dental conditions make it difficult or impossible for them to pay for even the minimum required service.

While it is well recognized and accepted that the responsibility for providing public benefits of any kind rests with the community, there are duties related thereto that fall naturally upon the shoulders of the specially qualified groups within the community. Problems related to medical service can best be handled by the medical profession. Those related to dental service can best be dealt with by the dental profession.

Socialization, insurance and other measures designed to meet the situation on a large scale are still in the formative stage, but many plans designed to care for relatively small groups are in actual operation.

FARM CREDIT ADMINISTRATION DENTAL PLAN

In a circular to the 800 employees of the Farm Credit Administration, Mr. Willard Parker, an executive in the local offices, recommended the adoption of a group prepayment plan. In proposing this "cooperative plan," the government agency encourages the enrolment of members of the family as well as the employees. In one paragraph, it states that no one will be prevented from going to his own dentist; but, in the next paragraph, it is stated that "a dentist will be selected. . . ." Each member is asked to pay $2.50 a year and in return will receive certain dental benefits. This appears to be another of those plans to aid employees in procuring "cheap dental care." If adopted, such plans are found to be inimical to the best interests of the patient.

THE ST. LOUIS HEALTH SERVICE PLAN

The Medical Economics Board of the St. Louis Medical Society was established in 1933, in contact with the Missouri State Medical Association and the American Medical Association for assistance and advice. Because of its activities, a medical economic security administration was formed, composed of a medical-dental service bureau, a group hospital service and a central admitting bureau.

Through the agency of the medical service bureau, budgeting on the part of patients enabling them to meet their medical and hospital bills is arranged. So far, indications point clearly to the eagerness of a large part of the working group to meet these conditions. Only after securing the consent of the physician, dentist or hospital are financial arrangements completed for the patient by the board. This is a form of credit dentistry.

THE DENTAL SERVICE PLAN

The Dental Service Plan of the Consolidated Gas Company of New York is one of the benefits offered to employees who are members of the Mutual Aid Society of one of the component companies which make up the Consolidated Gas Company system of New York City.

The dental service plan is a part of a medical service plan paid for by the "Sick Benefit Fund" of the Mutual Aid Society, an organization of company employees. This activity has been in operation through the mutual aid society of one of the component companies of the system, the Consolidated Gas Company, since 1901. No other components had asked for the inclusion of dental service as an additional benefit until recently.

An addendum to the constitution and by-laws of one of the companies, concerning the dental service, is as follows:

Designated dentists will be provided by the Medical Department, which will furnish members dental service . . .

1. The care of decayed teeth with silver, porcelain, cement or alloy fillings.
2. Extraction of teeth with the exception of impacted molars.
3. Prophylactic treatment.
4. The supply of missing teeth, only when a full denture is needed. (Full dentures will be supplied only to members who have had at least two years' membership in the Mutual Aid Society.)
5. Bridgework, inlays or any special type of dental repair work will not be included in dental service.

Those employees who earn from $15 and up to and including $46 a week are eligible. The average pay is $30 a week and the average family is 2.6 persons. Those who earn $15 a week contribute thirteen cents (13 cents) weekly, contributions varying according to salary up to those who earn $46 weekly. The rate of contribution is five-ninths of 1 per cent.

Ninety per cent of the employees who participate in the plan earn from $15 to $32 weekly. The remaining 10 per cent earn from $32 to $46 weekly. None participate who earn more than $46 weekly.

The company pays a sum of money into the fund which is equal to that contributed by the employees. This doubles the money in the fund, 50 per cent being contributed by the employees and 50 per cent by the company.

The dentists appointed were to work a minimum of eight hours weekly and not to exceed a maximum of sixteen hours weekly. Thirty-eight dentists were employed for this work, of whom fifteen practised in Brooklyn, six in Manhattan, seven in the Bronx and eight in Queens. The largest number, fifteen, was hired in Brooklyn because the greatest number of employees, 9,400, were eligible for service there. The fund available for dentistry was $90,000. This plan is a form of contract dental practice.

THE DENTAL HEALTH SERVICE, INC., NEW YORK CITY

The Dental Health Service, Inc. is an independent self-supporting dental clinic, located at 67 West Forty-Seventh Street, in New York City. Its purpose is to supply as nearly complete dental service as possible to persons of moderate means. The service operates one four-chair clinic in midtown Manhattan, working approximately eleven hours daily, for the benefit of low-income workers in industry as well as clients of social agencies. At present, the clinic serves approximately 2,500 persons annually.

Management was vested in the newly organized Committee on Community Dental Service of the New York Tuberculosis and Health Association, April 1, 1926, to be continued until such time as the service should be entirely self-supporting.

The dentists employed in the clinic all conduct private office practices, working in the clinic only a part of their time. The dental hygienists and administrative personnel are full-time employees.

The Dental Health Service completed the year 1933 with no financial loss, in spite of the fact that every item of expense

was paid out of income. No longer an experimental demonstration, the Dental Health Service is a permanent, well-organized, and soundly administered non-profit making community facility, supplying good dental service at a cost rate to self-respecting workers who are eligible for care in neither a charity clinic nor an average private dental office practice.

THE INTERNATIONAL WORKERS ORDER

The International Workers Order maintains a dental clinic for the use of members at 80 Fifth Avenue. The staff includes five full-time dentists and two full-time dental hygienists. Typical charges are 50 cents for extractions, and $45 for a full set of "best quality" artificial dentures. The dental clinic has to date more than paid its own cost, and the surplus is being used to reduce the scale of charges.

THE WASHINGTON PLAN

The Washington medical and dental societies of the District of Columbia, in conjunction with the hospitals, have established a third division of the Medical Economic Security Administration, known as the Medical-Dental Service Bureau. It is a cooperative, non-profit enterprise to adjust payments for previous, present or contemplated medical, hospital or dental care. Its facilities are available to any person who encounters a financial problem with respect to medical care. The person is studied as to financial ability. A budget plan is worked out whereby he may pay old debts or contract to pay for necessary future services, with the total fees adjusted to his individual personal circumstances and incomes. The payments are made to the Medical-Dental Bureau, which in turn transmits the funds to the practitioners and hospitals.

THE FARMERS' UNION COOPERATIVE HOSPITAL ASSOCIATION, ELK CITY, OKLA.

Voluntary sickness insurance provides medical care and hospitalization for the members and their families under the auspices of the Farmers' Union Cooperative Hospital Association, a cooperative non-profit association in a rural area. This medical service plan was organized in 1929 by M. Shadid, who serves as medical director. The benefits include medical, dental and hospital services. The persons who join become stockholders in a non-profit cooperative association. A stockholder without dependents pays $12 a year; with one dependent, the rate is $18; for a whole family (any size) $25. Payments must be made quarterly in advance.

HEALTH INSURANCE LEGISLATION IN CALIFORNIA

The March 25, 1937, issue of *The Bulletin of the Chicago Dental Society* carries information concerning a recent development in California. It states that, at the moment, there are two important legislative propositions under way in that state. One, in San Francisco, providing for compulsory health insurance for municipal employees, has been adopted. It is to be provided for by a charter amendment and is sponsored by the Federation of Municipal Employees. Under this proposal, 14,000 employees and their dependents will be provided with health service, in which dental service is included.

The amendment as originally drawn provided for a board of nine elected representatives of the municipal employees. This board is to evolve plans for the insurance program. There were no provisions for representatives of health professions on the board. Subsequent amendments to the proposed charter amendment were made at the insistence

of the professional organizations whose members would be affected by the legislation. These amendments provided for free choice of physicians and dentists in hospitals and stipulated that no exclusive contract would be let for the various services.

Provision was also made for a board of review to consider complaints, etc. These amendments carry the endorsement of the medical and dental societies.

The second insurance legislative proposition was introduced in the state legislature at the request of the California Medical Association. It sets up provisions to permit physicians, under certain conditions, to organize health service associations. In this bill, at the time of the report, no mention is made of dentists or dentistry and, in accordance with the letter of the measure, dental service would be rendered by physicians.

It is unnecessary to discuss in detail the many other plans that have appeared, but we must take cognizance of the fact that the idea of making health service available to the entire population has made substantial gains in spite of opposition. While we may rightfully question motives, they are for the moment beside the point. It is undeniable that the movement is making a favorable impression on the public mind. The sponsors are fortified with much that is sound and much that is appealing as far as the public is concerned.

Medicine is well able to care for its own problems and, because of many years in public health work, is in a far better position to meet eventualities than are we. It behooves us to undertake a serious study of the question with a view to determine just how dentistry should best fit in the picture. It will not be denied that there has been far too much propaganda and too little factual information carried to the dental profession in connection with this subject.

Most of the efforts directed toward the enactment of federal or state-wide programs are now being concentrated on plans which would provide for financing through a fund contributed to by employees, employer and state. This is essentially an insurance plan, in contradistinction to a state or socialized plan wherein the service is financed entirely by government funds. While there is a strong sentiment against any Simon pure, private insurance plan, *i.e.,* where insurance companies participate, the type of service provided by "private group practice" is essentially an insurance type of service. This provides for a fixed annual rate for which the individual and his family receive specified services. Other services are extra and are paid for in accordance with an agreed scale of fees. The insurance feature in this service lies in the fact that a calculated percentage of the contract holders will require either no service or a very limited service, thus making it possible for the remainder of the group to be served at a low *per capita* rate.

We hear such expressions as socialized collectivism, communism, panel dentistry, state dentistry and regimentation. For the most part, these expressions have been used loosely and without knowledge of their true meaning, and for the purpose of causing confusion, stirring up antagonism and creating prejudice.

It is absurd in the extreme to suggest that by seriously considering this subject in its various phases for the purpose of analysis and study, we are assuming an attitude either for or against any proposals. It will be our privilege, either collectively or individually, to oppose or favor any plans for dentistry in community health service, but as members of a profession charged with a great responsibility, we should be ready to support our position intelligently and should not permit our decisions to be influenced by

anything short of mature study of all facts.

Extremely radical measures could hardly be brought to a realization through other than drastic changes in our form of government. In that event, the dental profession will neither be neglected in the changing order, nor, is it likely, be especially selected for the yoke.

However, history tells us that rather startling changes can be brought about without resort to political upheavals. For example, December 18, 1917, the Eighteenth Amendment to the Constitution of the United States was proposed. It was declared to have been ratified January 29, 1919, and to have gone into effect January 16, 1920; and overnight, so to speak, hundreds of thousands of persons who were dependent on the sale of alcoholic beverages for a living were forced to seek other means of earning a livelihood. Industrial concerns that had been in existence for many years and whose legitimacy had been legally recognized were wiped out without consideration for the rights of the large group of citizens engaged in the principal and associated industries. This all came about by due process of law. We are reminded that prohibition became an actuality because a few energetic persons believed that it would be a public benefit.

There are over 200,000 physicians and dentists in a total population of 120,000,000 in the United States. I do not believe that the proponents of more widespread distribution of health service wish to oppose or antagonize the health professions. To the contrary, they appear to desire, and assure us that they would welcome, the cooperation of the health professions. Some of the proponents of various types of socialized health service have asked medicine and dentistry for a plan that would meet the needs of the situation, and that would be satisfactory to all concerned.

In attempting to formulate a public health policy for dentistry, we are without precedent to guide us. The experience in other countries may aid us in a measure, but we cannot make valid comparisons, because of social, economic and political differences. Moreover, the type and standard of dental service to which our people are accustomed differs greatly from that which prevails in other countries.

The problem of adequate health service from the viewpoint of the physician is the subject of inquiry by the American Foundation, Inc., which has published under the title "American Medicine—Expert Testimony Out of Court" a report compiled from answers to inquiries sent to 2,200 physicians comprising, according to the *New York Times,* a veritable "Who's Who" in medicine. While dental service was not touched on, this publication holds special interest for dentists, since every argument for or against the various plans for medical service bears with equal or greater force on dental service. Every dentist should acquaint himself with this work. Those who do not desire to read the full report would do well to read the editorial and magazine article in the *New York Times* of Sunday, April 4, 1937.

In conclusion, we cannot stress too much the fallacy of the assumption that dental service will fit into any health program that may be evolved. This attitude is, as shown, due to false concepts of what constitutes dental health service. If dental treatment is to consist of something more than a purely emergency service, it becomes important that certain differences between dental service and medical service be given serious consideration. Many persons, throughout a long life, require practically no medical service; and many others require very little and at infrequent intervals; and many persons come through serious ill-

nesses without medical aid. On the other hand, it is well known that:

1. Practically everybody frequently requires dental service.
2. Dental disease is predictable.
3. Unlike most other diseases, dental disease does not correct itself.
4. Uncorrected dental diseases grow progressively worse.
5. There are no known preventives, such as vaccines and antitoxins, for dental caries.
6. Correction of tooth affections always requires the personal service of the dentist.
7. Dental treatment is time consuming.
8. Dental disease is a constantly recurrent disorder that necessitates continuing treatment year after year practically through life, or at least as long as the teeth are retained.
9. Adult service frequently differs markedly from that for the adolescent.
10. There are many types of dental service, some acceptable, some not, the type of service varying with the skill of the dentist as well as the ability or willingness of the patient to pay.

These ten points are enumerated as some of the outstanding differences which influence the administration of dental service as compared with medical service. If the public health is to be adequately served, these important conditions may not be disregarded in planning a program for adequate "health service."

It must be obvious to any one understanding the problems involved in providing a dental service as part of a community health service that complete care for adults whose mouths have been neglected is, because of required chair time, cost of materials and processing, practically impossible. Therefore, the adult service must of necessity be of a very limited type. This fact should be frankly stated at all times.

There can be no denying that trends point toward a more widespread distribution of health service. The evidence is before us in a large number of local programs in actual operation, only a few of which were mentioned in this paper. Furthermore, in the organized movements for state wide and nation wide programs, the views of physicians on the medical aspects of health service as expressed in *American Medicine* disclose an awareness to the situation on the part of the medical profession.

The dental profession should take cognizance of the situation and get into action. Medicine has its own problems, and we have ours; and, as stated before, in many respects, ours differ from those of medicine. One of our first duties is to come to an understanding as to the objective of dentistry, and to define dentistry in public health. The formulation of standards and policies in public health programs is urgent. They should be subject only to such modifications as conditions demand, but should not be elastic to the point of unworkability.

The aim should be to provide a complete service for children within the limits of available facilities. "Children first" should be the slogan; for only by following such a program can we ever hope to accomplish any real good. It has been demonstrated time and again that it is futile, from the standpoint of permanent benefit, to attempt to provide an adequate service for all.

A policy based on a division of the facilities, 80 per cent for children and 20 per cent for adults and adolescents, may appear to be a harsh one, but it would result in a more permanent good than does the haphazard "Take them as they come" policy. Under the latter plan, many children are excluded in order to provide a partial and questionable type of service for adults who, through neglect,

are crippled beyond repair. In many instances, the time and money expended in such efforts amount to actual waste.

The standards of dental service followed on the North American continent are acknowledged the highest anywhere. The adoption of any policy that would tend to lower this standard is unthinkable.

Under a health insurance program, for example, only an emergency type of dental service could be provided, because practically all the insured would require continuous dental service; whereas, many of the same persons would not require any medical service and many others very little. It is the latter group that make insurance possible. To include a complete dental service would make the cost of insurance prohibitive. This, of course, would not be the case when a complete service had been provided for the preschool and the school child.

It is because of the absence of a definite public health policy for dental service that the dental profession in many communities finds itself helpless in the face of situations wherein uninformed officials have undertaken to administer dental service under conditions which are an imposition upon those receiving it and extremely damaging to the dental profession.

We should no longer allow the question to go by default: it is our duty to decide the direction in which it shall develop. We have an obligation both to the public and to ourselves which we must not ignore.

501 Madison Avenue.

METASTATIC CARCINOMA OF UPPER JAW FROM A PRIMARY BRONCHOGENIC TUMOR: REPORT OF A CASE*

By MANUEL GOTTLIEB, B.A., D.D.S., New York City

THE following case of primary carcinoma of the bronchus with metastasis to the upper jaw is presented, not only because of the rarity of secondary neoplasms of the jaw, but also, and particularly, because it appears that no similar case has been reported in the literature. According to Rabin,[1] in approximately 300 cases of primary carcinoma of the lung observed at the Mount Sinai Hospital, none has been observed with clinical evidence of metastatic lesions in the mandible or maxilla.

*From the Dental Service of Mt. Sinai Hospital.

Jour. A.D.A. & D. Cos., Vol. 24, July 1937

REPORT OF CASE

History.—Dental: A man, aged 38, a furrier, was admitted Sept. 30, 1935, to the Neurologic Service of Mt. Sinai Hospital. He was referred to the dental department for examination, October 2, because of the presence of a mass in the upper left jaw. Until this time, no definite diagnosis of his condition had been made, although melanosarcoma of the spinal cord was suspected. There was a history of pain in the area of the upper left lateral incisor tooth a few weeks before admission, as well as severe pain in the back. Examination by the patient's dentist revealed a mobile upper left lateral incisor, with swelling in the labial and palatal areas. According to his report,

clinical and roentgenologic studies showed no pathologic alterations. Although the upper left lateral incisor was negative clinically and roentgenographically with respect to caries, pulp involvement or periapical infection, the tooth was extracted. The following day, the patient returned with exacerbation of back pain and severe pain in the upper left jaw. At this time, a "strawberry-colored" growth, extending from the socket of the extracted tooth, was noted.

External examination of the patient in the dental department revealed no abnormalities. The submaxillary and cervical lymph nodes were not palpable. Intra-oral examination revealed a lack of oral hygiene,

Fig. 1.—Necrosis of bone in upper left lateral incisor area. (The lateral tooth had been extracted.)

absence of many teeth, much caries, advanced periodontoclasia and marked fetor oris. In the upper left lateral area, there was observed a mass simulating granulation tissue. The growth had progressively increased and was now approximately 2.5 by 1.5 cm., extending labially and palatally. The mass was reddish purple, tender to the touch, not ulcerated, soft but not fluctuant, irregular in contour and sharply differentiated from the surrounding tissue, which appeared normal. The upper left central and cuspid teeth were slightly mobile. Roentgenographic examination of the upper and lower jaws revealed no abnormalities, except for the involvement of the upper left lateral incisor area (Fig. 1); *i. e.* (1) destruction of the peridental membrane and lamina dura of the upper left lateral incisor; (2) an area of beginning apical resorption with thickening and furrowing of the peridental membrane of the upper left cuspid tooth, and (3) destruction of the bone between these teeth, extending from the alveolar crest to the midpoint of the teeth involved. In the bone 1.5 cm. above the central incisors and cuspids, there was evidence of necrosis.

October 3, tissue was removed from the tooth socket and from its labial extension for biopsy. At the same time, the area was probed. It was possible to advance the probe through the socket into the necrotic area of bone. The laboratory reported embryonal squamous-cell carcinoma.

About a week later, the patient complained of intense and persistent pain in the maxilla. Examination now revealed a diffuse exuberant ulcerated growth approximately twice as large as on admission. There had been marked extension to the labial and palatal areas. Superficial pressure yielded a seropurulent discharge. Fetor oris was more pronounced than when first observed. In order to relieve the patient's discomfort, a large portion of the mass was removed. The patient died Nov. 1, 1935.

Medical: The patient entered the hospital for the first time Sept. 30, 1935, suffering from pain in the right shoulder and shooting pain in the lower right chest of six weeks' duration. He also complained of heaviness and numbness in the legs.

The past history was irrelevant. The patient had passed an insurance examination six months prior to admission. His health had been good until the gradual onset of the shoulder pain eight weeks previously. Five or six weeks ago, there had been an onset of severe shooting pains beginning in the lower spine and radiating anteriorly. The p in was constant and refractory. Three weeks before admission, the patient went to his dentist and had the upper left

lateral incisor tooth extracted. He had lost 15 pounds in eight weeks.

Physical examination on admission was essentially negative except for the presence of many brown pigmented nevi over the torso. It is interesting to note that this finding prejudiced the medical observers in favor of a tentative diagnosis of melanosarcoma.

Neurologic examination revealed flaccid paralysis of both lower extremities. The right upper extremity showed marked weakness in most movements. The abdominal reflexes were absent. The left cremaster was sluggish. There was no evidence of cerebral involvement. Babinski's sign was present and bilateral.

Urinalysis revealed a specific gravity of 1.020; no sugar nor albumin; red and white cells present.

The blood count revealed: red blood cells (erythrocytes), 4,800,000; white blood cells (leukocytes), 17,600; polymorphonuclear leukocytes, 72 per cent. The Kahn test was negative. A smear was normal.

Roentgen-ray examination revealed (1) irregular destruction of the outer third of the right clavicle and seventh rib; (2) a circumscribed shadow in the first intercostal space on the right side, suggestive of carcinoma of the lung; (3) no evidence of destruction of the spine, and (4) extensive, irregular destruction of the right innominate bone.

The clinical course was marked by evidence of increasing cord compression. The patient received deep radiation therapy, but despite this went rapidly downhill and died.

Biopsy Report.—Examination of tissue from the tooth socket (Fig. 2) revealed that the gingival epithelium had lost its original structure and was invaded and destroyed by a highly anaplastic squamous type of cell. The cells were large, cylindrical and ovoid. Many were distorted. The nuclei were irregular, large and hyperchromatic. The cytoplasm contained many fine deep-stained granules. Intercellular bridges were seen between cells in certain areas.

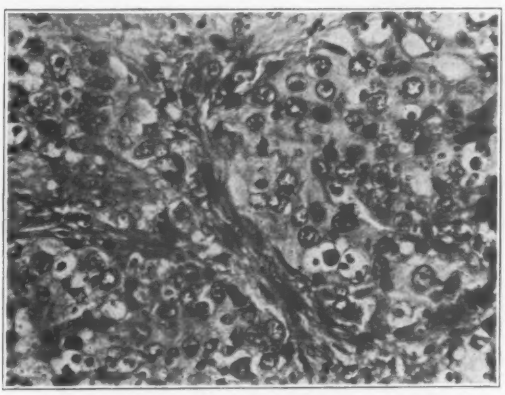

Fig. 2.—Anaplastic squamous-cell carcinoma (inflamed); biopsy specimen taken from tooth socket (metastatic region).

Large areas of necrosis, hemorrhage and acute inflammation were evident. Tumor cells were seen within blood channels.

Examination of the right upper lobe of the lungs revealed a structure similar to that described above. (Fig. 3.)

Diagnosis.—Primary bronchogenic carcinoma arising from the right upper lobe bronchus with multiple osseous metastases (skull, maxilla, ribs, right clavicle, right os innominatum), with metastases to the mediastinum and cervical lymph nodes, lungs, superior vena cava, right suprarenal gland and spinal cord, was diagnosed.

Necropsy Findings.—The description is

restricted to the pathologic alterations in the right lung, which was considered to be the primary focus of dissemination. At a point in the right main bronchus, 1 cm. from the carina, the reddened mucosa abruptly became firm, yellow, white, opaque and finely granular. Arising from this point and spreading centrifically was an irregular tumor mass, measuring 3 by 3 cm. The tumor was firm, yellowish white and granular, extending into the paravertebral and

Fig. 3.—Primary bronchial carcinoma arising from right upper lobe bronchus. Upper arrow, lymph node; lower arrow, primary carcinoma.

axillary divisions of the right upper bronchus. The apical division was also involved by the mass.

COMMENT

Reference to the literature during the past twenty years reveals but few cases of metastatic neoplasm of the jaw. None of these resembles the case presented in this paper with respect to the primary source. Cases of secondary neoplasm have been recorded by Dechaume[2] (primary origin in renal epithelioma); by Bernard[3] (primary tonsillar carcinoma), and by Thoma,[4] who cited cases wherein the focus of dissemination resided in the breast, kidney, prostate and thyroid carcinomas. Geschichter and Copeland,[5] in 1931, grouped 334 cases of primary tumors which were responsible for bone metastases. In carcinoma of the lungs, involvement of bone was found in four (16 per cent) of twenty-four cases analyzed. These cases did not involve either mandible or maxilla. The metastases occurred to the spine, pelvis, skull (frontal

bone) and ribs. It is evident, therefore, that clinical finding of secondary deposits in the maxilla, attributable to squamous-cell carcinoma of the lung, is very uncommon, and possibly this is the first of its kind reported.

Because of the rarity of this condition and because of the frequency of metastatic carcinoma of the lungs, the question may arise as to whether the jaw lesion was primary or secondary. From the point of view of pathology, it appears to be unquestionable that the lesion in the maxilla was metastatic. A study of the incidence, route of invasion, clinical course and postmortem findings furnishes corroborative data:

1. As far as the factor of incidence is concerned, there have been reported hundreds of cases of primary squamous-cell carcinoma of the lungs; whereas, a primary neoplasm, if considered a central tumor in the maxillary bone, is extremely rare. Since carcinoma is of epithelial origin, tumors in bone are usually secondary to tumors located elsewhere. Furthermore, since there were multiple osseous metastases in this case, *i.e.,* to ribs, clavicle, skull and innominate bone, it is a fair assumption that the lesion in the maxilla was a central carcinoma and not peripheral (one that grows from the surface epithelium). Were it of peripheral origin, one would not expect the tumor cells to invade one localized portion of the epithelial tissue of the maxilla without manifesting growth in any other epithelial structure of the body.

2. Metastatic involvement of the suprarenals secondary to bronchogenic tumors is frequently encountered. Implication of the suprarenals as a result of primary maxillary carcinoma has not been recorded.

3. The patient had suffered with severe right shoulder pains five weeks before he complained of pain in the upper jaw. He was also stricken with back pains three weeks before the jaw discomfort developed. Were the lesion primary in the maxilla, it seems logical to assume that the jaw lesion would have become manifest to the patient at a much earlier period, with signs of pain and subjective indication of an abnormal growing mass of tissue in the mouth. Furthermore, the fact that the patient had an acute exacerbation of back pain after the extraction of the tooth is a factor in the surmise that the primary focus was elsewhere than in the maxilla.

4. The necropsy findings indicated the presence of a primary lung neoplasm, as judged by its arrangement in the form of a single mass; whereas, secondary pulmonary metastases are more likely to be characterized by scattered nodules of relatively equal size.

One of the most interesting features in this case was the observation that the tumor mass became evident clinically and roentgenographically in no area in the jaws except that of the tooth extraction. It seems probable that this region was a *locus minoris resistentiae* and, consequently, a site of predilection for metastases. It might further be presumed that the tumor cells had been present in the upper jaw for a long time and that the extraction of the tooth was a factor in promoting the growth and activity of the cells.

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PHYSICAL PROPERTIES OF FILLING MATERIALS

By GEORGE M. HOLLENBACK, D.D.S., Los Angeles, Calif.

DENTAL caries, being the most prevalent of all diseases, with an effect so obvious and the cause of great discomfort to those afflicted, has received much consideration from the dawn of history.

The cause of dental caries is as yet not fully understood and there is a great variance in opinion as to its origin. There are two predominating schools of thought, one contending that caries develops entirely from conditions existing within the oral cavity; the other that the systemic condition is responsible for this disease and that local conditions are definitely secondary. A midway position is taken by many in the belief that caries is, in some instances, entirely the product of local conditions, while in others it is due to the local environment plus a systemic background. This position seems altogether tenable in view of present knowledge of the subject.

This presentation will have to do with one type of remedy for the disease dental caries. This remedy, the only one to date that has any great percentage of success to its credit, consists of the mechanical stoppage or filling of the carious cavity, which has been prepared for the reception of the material selected.

While the tabulation of successful cases would probably prove disappointing, results have been sufficiently good to establish beyond a doubt the great value of this procedure. The failure of restorations of this class can usually be attributed to (1) incorrect preparation of the carious cavity; (2) poor judgment in the selection of the material to be used, and (3) a lack of understanding of the physical properties of the material selected, with which must necessarily be coupled the inability to use it correctly. This last cause is by no means the least of the three.

Many materials have been used for restoring carious teeth. Today, through a process of elimination of the unsatisfactory, only a few are extensively used: gold-foil, amalgam and cements of several kinds, the most popular being zinc oxyphosphate and silicious cement. Cement may be used as a filling material alone or in combination with other materials, such as gold, porcelain and amalgam. Gold-foil was probably one of the first materials used in the treatment of dental caries, and the fact that it is still being used and is almost universally regarded as the filling material of choice says much in its behalf. According to Black, it possesses to a greater degree than any other, the physical qualities of the ideal filling material. I quote from Black's Operative Dentistry, Volume 2:

> The qualities most desired in a filling material for permanent operations are indestructibility in the fluids of the mouth, adaptability to the walls of cavities, freedom from shrinkage or expansion after having been made into fillings, resistance to attrition and sustaining power against the

(Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935. Received for publication Sept. 17, 1936.)

force of mastication. The qualities of secondary importance are color, or appearance, non-conductivity of thermal impressions, and convenience of manipulation.

It will thus be seen that gold-foil possesses almost 100 per cent the properties of first importance to the ideal filling material. In the qualities of secondary importance, it does not meet the first two at all and the third only to a limited degree.

It is not the intention to enlarge on its physical properties and general excellence. The investigations carried on by G. V. Black relative to the physical properties of gold-foil will, because they are fundamental and complete, stand for all time practically without change or addition. It is the only filling material whose physical properties are so well known that for its use there can be evolved definite technics, which, when followed, will always assure constant results. If any one who doubts the truth of this statement will carefully investigate the physical properties of all other filling materials, he will find that the properties of not a single one are sufficiently understood or controllable to such a degree that constant results can be assured in their use. More will be said of this later in the consideration of other materials.

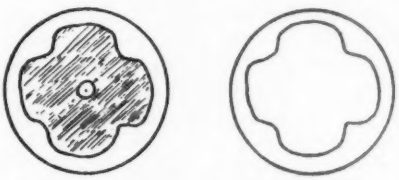

Fig. 1.—Top view of gold disk: left, without inlay; right, with inlay in position. This disk is made of gold to permit removal of the cemented inlay by immersion in acid.

This material is without a peer in its class. It is the only one that has proved clinically the ability, when correctly applied, to assure restorations that are permanent. All of us have seen gold-foil fillings which have endured for from forty to sixty years without the slightest sign of failure, and it can be said that any skilled operator who understands the physical properties of this material and the technic of its use can make restorations which may be well considered permanent. I wish to make the strongest possible plea for the more extensive use of this material. While the renaissance of gold-foil, which has been so long heralded, is now here, it has not reached nearly great enough proportions. If the best interests of the public are to be served, ten times as many gold-foil restorations should be made.

Gold may be used in combination with cements as a filling material, the cast gold inlay being the best example of this. This type of restoration has many features to commend it. By its use, extensive restorations can be made of teeth badly broken down by caries, and form and function be more nearly restored than with any other material or method at our command. The physical properties of gold may be so altered by the addition of other metals that any degree of hardness may be obtained, from that of pure gold to that of the highly platinous gold and copper alloys, which have proved so satisfactory in shallow inlays in which a higher degree of hardness, strength and elasticity is necessary. Gold in the form of the cast inlay does not meet the re-

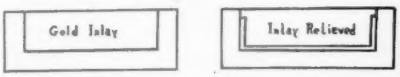

Fig. 2.—Cross-section of disk with inlay in position: left, before relieving; right, after relieving cavosurface by etching with aqua regia.

quirements of first importance in a filling material nearly so well as gold-foil, for the following reasons: The inlay itself is, of course, indestructible in the fluids of the mouth if made of suitable gold alloy. The gold inlay does not permit of complete adaptation to the walls of the cavity, but depends for this adaptation on cement, which, to say the least, is a material of somewhat questionable value and is certainly not insoluble in the fluids of the mouth. Gold inlays are free from shrinkage or expansion, except in the presence of thermal changes. The coefficient of expansion of gold and its alloys is greater than that of tooth substance.

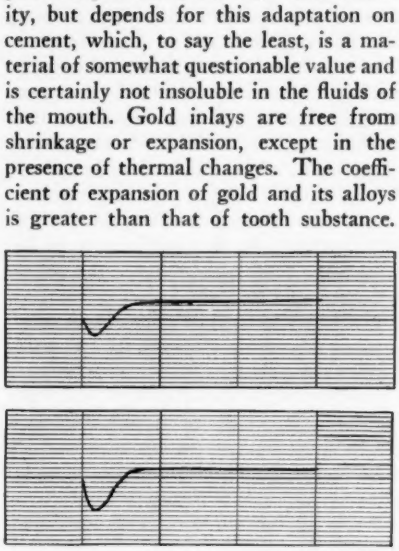

Fig. 3.—Results of two tests with the same alloy, under same conditions, except that test charted above was begun fifteen minutes after mix was started. The test charted below was started seven minutes after starting of the mix.

This being the case, the cementing medium must necessarily be subjected to very severe usage during a variation of 50 degrees, with resulting expansion when carried above mouth temperature and contraction when carried below it. More will be said of this later. As to resistance to attrition and sustaining power against the force of mastication, the gold inlay is superior to gold-foil, unless the latter is made of pure gold or alloy of a very high carat. It is quite generally believed that many restorations with gold inlays cause great damage because alloys that are too hard and resistant are used. While this is admittedly not universally accepted as true, my own clinical experience leads me to believe that such is the case. As for the requirements of secondary importance, the first is met to the same degree as with gold foil. The second requirement, nonconductivity of heat or cold, is best met by the gold inlay because of the cement interposed between the inlay and the tooth substance. The third requirement, the convenience of manipulation, gives the cast inlay the better of it in extensive restorations and those difficult of access, while foil best meets the requirement for all others.

The great weakness of the gold inlay is the cementing substance used in sealing it in the cavity. With our present day knowledge of the physical properties of gold alloys and the properties of various materials used in gold inlays, it is possible to make inlays that very accurately fit cavities and with considerable ease, but the most perfect gold inlay is still dependent on the use of cement to seal it to the walls of the cavity. All cements now available are more or less soluble in the oral fluids, and, in some environments, remarkably so. This alone has been the most common cause of failure of gold inlays. It is only necessary to follow the research on dental cements being carried out by the Bureau of Standards to become convinced that these materials are undependable and inadequate. Test mixes made under ideal conditions and with a care and precision which it would be well nigh impossible for the practitioner to use have given us information which, to say the least, is most disheartening. While it has long been known that zinc oxyphosphate cements are freely soluble in both acid and alkaline media, this solubility being in inverse ratio to their concentration, it comes as somewhat of

a shock to most of us to learn that this type of cement is also soluble in neutral aqueous media. Saliva can then, under all conditions, be considered a solvent for these materials; perhaps only slightly so when it is comparatively neutral in reaction, but as the p_H rises above or recedes below 7, this solubility is greatly increased. This probably accounts for the great variation in the durability of cement in different cases. It has also been shown that dental cements are not truly adhesive and that they possess very little edge or crushing strength. Some of them are distinctly porous even when mixed under ideal conditions. Of course, porosity will, in the mouth, permit absorption of organic material and bacteria, resulting in putrefaction. This is amply proved by the odor noted when cement fillings are cut away or when cement is removed from beneath a crown. Next to solubility, the most serious defect of oxyphosphate cement is its friability. I have mentioned the difference between the coefficient of expansion of gold and that of tooth substance; also the fact that the temperature in the mouth might vary as much as 50 degrees Fahrenheit. Let us consider what might well happen in extensive restoration under the following conditions: We shall assume that the normal or neutral point is 95 degrees, the existing temperature when the inlay was cemented to place. When hot food or liquid is taken, it is altogether possible that the temperature of the inlay may be raised to as much as 120 degrees, considerable expansion resulting. The substance of the tooth would expand to a less degree, for two reasons: (1) its coefficient is lower, and (2), being a nonconductor, it would not be heated to such a high degree as the inlay. Now what would be the effect? The cementing medium, being a very friable material with low crushing strength, and not attached to the inlay or the cavity wall, might be crushed after it had received many such powerful impacts. These impacts would occur very frequently; and the thermal expansion of metal being a well-nigh irresistible force and the cavity walls exerting a considerable counter force, it will thus be seen that the cement occupies a difficult position and one which, because of its physical properties, it cannot fill satisfactorily. When cold food or liquid is taken in the mouth, the result will be contraction of the inlay and a

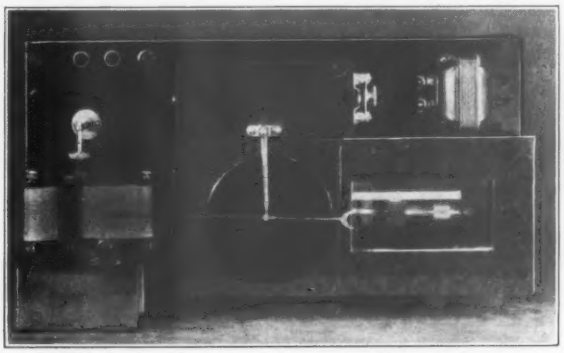

Fig. 4.—Top view of graphic recording instrument.

tendency to pull away from the cavity walls. The cement, being practically nonadhesive, will offer no inhibitive effect and will tend to pull away from the surface of the inlay, the cavity wall or both. This, in time, will be almost certain to cause leakage. Many of the blue margins we so frequently see may be due to this. I want it understood that this is purely speculative and, as far as I know, has not been proved clinically or by laboratory tests.

I am intentionally omitting the physical properties of cement, concerned in its mixing and setting qualities, and I refer those who are interested in this phase of the matter to the work of the Research Commission of the A.D.A. in conjunction with the Bureau of Standards.

I have recently carried out a series of experiments to determine the possibility of accurately seating well-made cast inlays in the presence of dental cement. In making these experiments, a disk of gold approximately 10 mm. in diameter and 3.5 mm. thick was cast. A cross-shaped cavity was accurately milled in one face of this disk, approximately 2 mm. deep, the walls being slightly divergent. A wax pattern was made of the cavity and was accurately reproduced in gold. This was inserted in the cavity and ground exactly flush with the face of the disk. (Fig. 1.) The thickness of the disk with the inlay in position was accurately measured with a micrometer. A zinc oxyphosphate cement having a very finely divided powder was selected. A mix was made of this of proper consistency for cementing a gold inlay. The cement was placed in the cavity and an attempt was made to force the inlay to its seat with heavy pressure and malleting greatly in excess of force applicable in the mouth. When the cement had set, the excess was carefully removed and the disk again measured with the micrometer. Its thickness, with the cemented inlay, was found to be 0.009

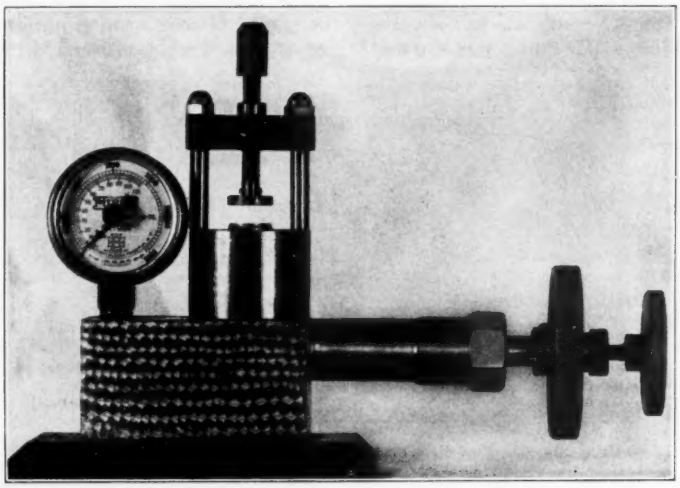

Fig. 5.—Hydraulic press for ascertaining ultimate crushing strength. The speed with which force is applied to the specimen is under control at all times.

inch in excess of the previous measurement. This proves the impossibility of completely seating an inlay in the presence of the types of cements in use today. Of course, it will be appreciated that, in this particular test, the difficulty to be overcome was perhaps considerably greater than that with the average gold inlay, but this condition always exists and

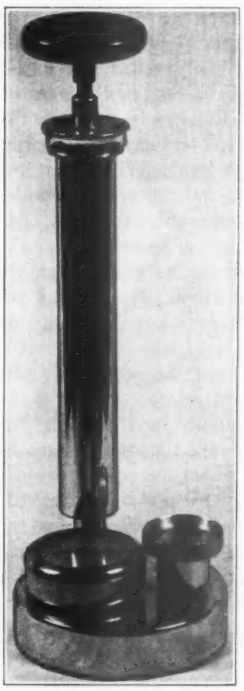

Fig. 6.—Pressure device for testing experimental fillings. Pressure up to 80 pounds per square inch may be used. Test dies for amalgam have cavities 3 mm. deep and 4½ mm. in diameter.

it certainly will more or less affect every cemented inlay. Another experiment was made as follows, the same disk and inlay being used: The inlay was first treated by covering its entire outer surface and the inner surface adjacent to the margin to a depth of a little less than 1 mm. with wax. The inlay was then immersed in *aqua regia* (nitrohydrochloric acid) for ten minutes, this having the effect of reducing the uncovered portion of the inner surface, or cavosurface, a very little, perhaps 0.002 or 0.003 inch. (Fig. 2.) Another mix was made of the same cement, the consistency being as nearly as possible the same as that of the one used in the first experiment. The inlay was again cemented in the cavity, comparatively little force being used, as it was not necessary. Measurement taken by the micrometer showed that the inlay lacked only 0.00125 inch of going completely to place. This showed the difference of 0.00775 inch between this experiment and the first one. Little comment is, I think, necessary, as this proves the fallacy of attempting to seat a well-fitted gold inlay unless provision is made for the space which must necessarily be occupied by cement.

Combinations of cement with porcelain are in quite general use today. Little will be said of this type of restoration, except to point out the fact, amply proved by clinical experience, that oxyphosphate cement, when used for the cementing of porcelain inlays, does not show nearly the tendency to disintegrate as when used for cementing gold inlays. I believe this is due to the lower coefficient of expansion of porcelain; which, of course, would minimize the mechanical destruction of the cement resulting from excessive expansion or contraction. Consideration will not be given the cements when used alone as a filling material, but I wish to emphasize the fact that zinc oxyphosphate, zinc chloride, copper oxyphosphate and silicious cements all possess physical properties of such a nature that they cannot be considered seriously as permanent filling materials.

The last filling material to be considered is amalgam. Many good operators consider it second only to gold-foil in merit. Amalgam has probably been more extensively used than all other materials combined. It has also been more abused than any other material, and its physical properties are the least understood by the rank and file of the profession. In spite of all this, amalgam has probably saved more teeth than has any other material. Amalgam was first introduced in America in the early part of the nineteenth century. It seems that certain members of the profession immediately formed an intense dislike for it. These practitioners contended that any one who used it as a filling material was a charlatan. In view of the quality of the material and the way it was used at that time, this attitude was justifiable. These early amalgams were made by filing silver coins and combining the filings with mercury. A little later, tinfoil was added for greater plasticity and easier amalgamation. It was soon observed that these amalgams showed a marked tendency to volume change. Sometimes, excessive expansion occurred, but more frequently contraction. About the middle of the century, amalgam began to attract the attention of some of the leaders of the profession, both here and in Europe. Considerable investigation was made from time to time, none of which was at all complete or conclusive. About 1895, G. V. Black started an investigation, at the conclusion of which he gave findings that were conclusive and complete in detail. His findings relative to the composition of balanced alloys and the physical properties and the behavior of amalgam were fundamental. His work has been everywhere accepted and is the basis of all the enormous amount of research which has followed. Many different investigators have greatly added to the scope of this subject, but not a single fundamental has been added to Black's original presentation.

The research division of the A.D.A. working in conjunction with the Bureau of Standards has carried on a complete investigation of dental amalgams and has drawn up detailed specifications for these materials. These specifications provide certain standards of excellence, so that it is now possible for the manufacturers of amalgam alloys to furnish the profession with material which is certified to conform to the specifications prescribed by the Bureau. Any of these certified alloys are probably superior to those that are not certified. The specifications allow leeway for considerable difference in composition and quite a wide latitude in some of the physical properties, particularly expansion and contraction. The specification formerly called for an alloy which would show not more than 4 microns per centimeter of initial contraction and an expansion of not less than 3 nor more than 10 microns per centimeter. The requirement relative to the initial contraction has since been deleted. Apparently, it is believed that the amount of contraction is of no moment provided ultimate expansion exceeds it by at least 3 microns. There is no specification as to the time permitted for these changes to occur. The rules established for testing for expansion and contraction read in part as follows: "All expansion values cover the period from fifteen minutes to twenty hours after starting the mix." It would seem that this rule might well be altered. The thing that we should be primarily interested in is exactly what occurs when an amalgam filling is placed in the mouth; that is, what occurs as soon as condensation or packing has been completed. It is altogether possible that changes during the first few minutes may be all important. I shall attempt to point this out. Let us arbitrarily assume that the average

time consumed for amalgamation is two minutes and that the allowable time for inserting the filling is five minutes; a total elapsed time of seven minutes. This will leave eight of the fifteen minutes of the prescribed time before testing is started. All expanding silver amalgams show the peculiarity of undergoing an initial contraction before expansion occurs. This contraction is very slight with some alloys and quite marked with others, as I shall show later on. Tests that I have made would indicate that the amount of contraction occurring between the time packing is completed and the elapse of fifteen minutes from the time of starting the mix may be as much as 2 or 3 microns, and this combined with the additional contraction, which occurs after the elapsed fifteen minutes, may be a matter of great importance. I shall point this out as follows: Let us assume that two tests are made with the same alloy, and the same technic of amalgamation and packing is used. The first test is begun fifteen minutes after the starting of the mix. A contraction of 3 microns is shown and an ultimate expansion of 4 microns. According to this method of testing, this alloy comes well within the specifications relative to expansion, but, as a matter of fact, the result is really deceptive. The second test is to be made under exactly the same conditions except that the test is started immediately after packing. During the interval between completion of packing and the lapse of fifteen minutes from the time of amalgamation, 2 microns of contraction are registered. Three microns more of contraction occur, followed by ultimate expansion of 2 microns, which is a true reading of the actual amount of ultimate expansion which has occurred, this being below the minimum specification prescribed by the Bureau. (Fig. 3.)

It seems to me that the ideal alloy would be one which has no initial contraction and little expansion. If we are to assume that a filling in a carious tooth must be sufficiently well adapted to exclude moisture and bacteria in order to prevent recurrence of caries, it would seem that unless an amalgam is practically static from the time that it is condensed, it would not necessarily meet this requirement. Of course, amalgam which shows ultimate contraction to any considerable degree would be without value as a filling material. Also, it seems reasonable that one possessing any considerable degree, say 3 microns or more, of an initial shrinkage would not be desirable. Graphs which I have made show that this initial shrinkage occurs usually over a period of from thirty to sixty minutes and, in some instances, a considerably longer time. It is the usual practice to remove the rubber dam very soon after condensation so that the occlusion may be adjusted before the amalgam has become too well set, the bacteria-laden saliva thus being permitted to bathe the newly placed filling. In extensive restorations, this initial shrinkage might cause a sufficient pulling away from the cavity walls to permit the ingress of moisture and bacteria. For instance, if the buccolingual diameter of the proximal portion of a cavity is 5 mm. and the initial shrinkage of the amalgam is 6 microns per centimeter, the net result will be 3 microns of contraction. The average size of the coccus forms of bacteria is 1 micron, and of bacilli, from one-half to three-fourths micron in diameter and 1.5 to 3 microns in length. It would seem possible for these organisms to pass between the filling and the cavity walls, and once there, they would be there to stay. For that reason alone, I feel that all amalgams that show more than a few microns of initial shrinkage should be discarded. It also seems to me that any considerable degree of expansion might

be undesirable. A moderate degree of expansion would be desirable in simple cavities, such as Classes I and V; but, in cavities of a more complex nature, it might cause a closer adaptation to cavity walls in some portions of the cavity and an actual pulling away in others.

Of course, much of the foregoing is somewhat speculative; yet it would seem that it is reasonable, and probably these very things do occur, to a degree at least.

I have used the following devices for testing dental amalgam:

1. The recording micrometer, an instrument designed to show the volume change of a material that is setting. These changes are registered on a paper strip, graduated in microns. Not only the amount of these changes, but also the time they occur, is recorded. This device being entirely automatic in operation, the chance of error is reduced to a minimum.

2. The hydraulic press, for ascertaining the crushing strength of various materials. Tests show that any of the certified alloys, when correctly used, show crushing strength greatly in excess of the required specifications. (Fig. 5.)

3. The air pressure testing device, which has given much information of value. By its use, the adaptable properties of a filling material can be easily tested, as well as the various technics for its use. While many may contend that the pressure test is unreasonably severe and that its successful use entails care and a technic not possible of application in the mouth, it allows one to learn how to adapt filling materials perfectly to cavity walls. If, as far as possible, we use in the mouth a technic which will hermetically seal a steel die against pressure up to 80 pounds per square inch, as registered by this device, we shall certainly do superior operative work.

I recently sent to individual dentists, to groups and dental schools, 150 dies, asking that these dies be filled with amalgam and returned to me for testing. While, in many instances, the results were very disappointing, in others they were astonishingly good. Many fillings stood the full 80 pounds' pressure of the testing device without the slightest leakage. In communities where much consideration has been given to fine operative technic, the results were uniformly good. These results prove that many of the present-day alloys meet requirements well, and if the members of the profession will only become more familiar with the physical properties and technic of its application, amalgam will take, and be entitled to, its place in the sun.

Gold-foil is still the material of choice as a permanent filling material. Amalgam, I believe, should be given second place; that is, if correctly used. The profession should learn more about it and use more of it.

The gold inlay comes third, in my opinion. Its weak point is that it depends on a soluble material, of considerable porosity and very slight strength, comparatively speaking, to seal it in the cavity. Incidentally, the physical and chemical properties of cement are not well understood by the profession and the technic of its use is difficult. With the proper cement, that is, one which is insoluble, non-porous, adhesive and strong, the cemented inlay would be greatly improved. Such a cement we do not have today, nor do we have one that approaches it.

CONCLUSION

I wish to make a plea for further study relative to the physical properties of filling materials, and to urge the members of the profession to familiarize themselves with these properties so that these materials can be used more intelligently.

I wish to express my appreciation for the valuable work done by the Bureau

of Standards in the study of dental materials. Sufficient time has elapsed to evaluate these investigations. Not only has information relative to the technical use of these materials been given us, but also standard specifications have been set up for various materials. Most manufacturers today are furnishing materials which comply with these standards. This is of inestimable benefit to the profession and has helped materially in raising the quality of dental service.

AVERTIN IN THE REDUCTION OF FRACTURED FACIAL BONES

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THE procedure of fixation and reduction of fractured mandibles has not altered much in many institutions in twenty-five years. Progress has been made in most directions, but a review of the literature relating to fracture of the facial bones shows that anesthesia is one phase that has been neglected. Diagnosis, reduction, methods of fixation and frequency of occurrence are discussed adequately and at length, but even the most thorough and best-regarded books on the subject give but scant attention to this matter. Just why this is, it is difficult to explain. No other operation in the entire repertoire of the oral surgeon is attempted without an anesthetic. No one has the brutality to perform an alveolectomy, a cleft-palate closure or a root resection or to enucleate a cyst without the use of some agent for the control of pain. Removal of neoplasms and impacted teeth, closure of clefts and even simple extractions are all carried out under anesthesia. To say that the reduction of all fractures was as painful as any of the above-mentioned procedures would be as unfair as the statement that no reduction or immobilization was painful. But certainly the most simple cases even when handled by careful, skilful operators cannot be classified under the heading of pleasure; while difficult, complicated situations cause agony approaching the limit of human endurance.

Various agents and procedures have been employed for abolishing and controlling pain during the operative period. The clinical records of such procedures have occupied very little space in our periodicals or textbooks. At the present time, there is no drug nor technic that can be used generally with safety or success in this work, and, as a result, probably a majority of facial fractures are being reduced without alleviation of the accompanying pain.

Before going into the subject of anesthesia, it might be well to recall the characteristics of the fracture case. The injury is nearly always due to violence. Because of the trauma, there is swelling, soreness, tenderness and, in a great many cases, displacement of the fragments. The institution of treatment cannot be deferred until these symptoms have subsided. Indeed, in many instances, they will not disappear until reduction and fixation have been effected. Nature com-

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TABLE 1.—DATA ON CASES STUDIED

Case	Date	Patient	Avertin Dosage Mg.	Preliminary Medication	Remarks	Rating
1	4/23/33	W.T.	60	Morphine 5 mg.	Light anesthesia; retains memory of operation; no pain	F.
2	4/27	A.P.	70	None	Analgesia; did not feel extraction of tooth, but remembers events of later part of operation; spoke rationally and continuously	P.
3	4/28	G.C.	80	None Morphine 5 mg. in midst of operation to quiet patient	Very noisy and pugnacious during operation, apparently retains memory of pain during operation	P.
4	5/6	P.C.	65	Morphine sulfate 7 mg. & $\frac{1}{150}$ grains atropine	Very quiet during operation; seemed to feel nothing except slight pain during extraction of tooth	G.
5	4/10	E.T.	65	Morphine sulfate 5 mg. & $\frac{1}{150}$ grains atropine	Patient talked continuously; does not recall having any pain during operation	F.
6	6/1	C.B.	80	Morphine sulfate 7 mg. & $\frac{1}{150}$ grains atropine	Patient seemed comfortable; some resistance; does not recall wiring in operating room	G.
7	6/8	A.S.	80	None	Patient very noisy and pugnacious; seemed to retain memory of making noise, but is not certain that he had any pain	F.
8	6/9	W.D.	80	Paraldehyde 2 drams ½ hour before operation	Anesthesia practically perfect; patient very quiet	V.G.
9	6/15	C.K.	80	Paraldehyde 2 drams 1 hour before operation	Anesthesia very good; patient very quiet and did not resist in the least, although he seemed to recall perfectly various events during operation	V.G.
10	6/29	J.S.	80	Paraldehyde 2 drams 1½ hours before operation	Anesthesia very good; patient moved around somewhat, but made no noise	V.G.
11	6/24	A.D.	80	Paraldehyde 2 drams ½ hour before operation	Anesthesia very deep; patient slept soundly for two days; 6/25/33, caffeine sodium administered by ward interne on account of coma-like appearance of patient; 6/26/33, retains no memory of operation; condition normal, although patient still somewhat drowsy	V.G.
12	6/26	J.L.	80	Paraldehyde 2 drams 1 hour before operation	Anesthesia very good; patient tried to move around somewhat	V.G.

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TABLE 1.—DATA ON CASES STUDIED (CONTINUED)

Case	Date	Patient	Avertin Dosage Mg.	Preliminary Medication	Remarks	Rating
13	7/7	E.C.	80	Paraldehyde 2 drams ¾ hour before operation	Anesthesia good; patient restless; rapid recovery; patient was awake and up two hours later	G.
14	7/13	O.B.	80	Paraldehyde 2 drams ½ hour before operation	Anesthesia perfect; patient fully relaxed; affected for several hours afterwards	V.G.
15	7/13	N.B.	80	Paraldehyde 3 drams ½ hour before operation	Anesthesia fair; patient very talkative and restless (alcoholic)	F.
16	7/14	A.P.	80	Paraldehyde 2 drams ½ hour before operation; 2 drams two hours before operation	Anesthesia fair; patient so restless and talkative as to be difficult to control (alcoholic)	F.
17	7/20	McI.	80	Paraldehyde 2 drams ½ hour before operation	Patient very quiet most of operation; recovery uneventful	V.G.
18	7/20	J.L.	80	Paraldehyde 2 drams	Perfect anesthesia; patient very quiet; slept several hours afterwards	V.G.
19	7/27	F.B.	80	Paraldehyde 4 drams	Very restless; fought; poor anesthesia (alcoholic)	P.
20	8/11	J.H.	80	Paraldehyde 2 drams	Fair anesthesia; patient talking and restless	F.
21	8/15	M.B.	80	Paraldehyde 2 drams	Anesthesia had very little effect; patient drowsy but awake	P.
22	8/15	J.B.	80	Paraldehyde 2 drams	Rather heavy sleep; poor anesthesia; patient complaining and restless	P.
23	8/24	A.	80	Paraldehyde 2 drams	Slightly restless; anesthesia good	G.
24	8/24	R.B.	80	Paraldehyde 2 drams	Screaming, noisy though untouched; remembers nothing	P.
25	8/24	P.M.	80	Paraldehyde 4 drams	Very quiet; very good anesthesia	V.G.
26	9/7	J.R.	80	Paraldehyde 2 drams	Very quiet; very good anesthesia	V.G.
27	9/7	H.W.	90	Paraldehyde 2 drams	Very quiet; very good anesthesia	V.G.
28	9/7 1st time	B.T.	90	Paraldehyde 4 drams	Noisy, fighting; no anesthesia; did not operate; patient does not remember anything that happened	P.
29	9/9 2d time	B.T.	90	Morphine sulfate 7 mg. & $\frac{1}{100}$ grain atropine	Very quiet; very good anesthesia	V.G.
30	9/9	E.H.	90	Morphine sulfate 7 mg. & $\frac{1}{120}$ grain atropine	Very quiet to end; remembered nothing and is well satisfied with anesthesia	V.G.
31	9/14	T.R.	90	Morphine sulfate 7 mg. & atropine, $\frac{1}{150}$ grain	Very quiet and easy to handle up to last few minutes, then became restless	V.G.
32	9/28	G.W.	80	Paraldehyde 2 drams	Perfect	V.G.
33	9/28	F.J.	80	Paraldehyde 2 drams	Perfect	V.G.

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TABLE 1.—DATA ON CASES STUDIED (CONTINUED)

Case	Date	Patient	Avertin Dosage Mg.	Preliminary Medication	Remarks	Rating
34	10/5	M.	80	Paraldehyde 2 drams	No anesthesia; resorted to nitrous oxide-oxygen and ether	P.
35	10/4	Q.	90	Morphine sulfate 7 mg.	No anesthesia; fracture reduced without anesthesia; avertin spilled	P.
36	10/14	B.D.	90	Morphine sulfate 7 mg.	Perfect anesthesia	V.G.
37	10/20	H.L.	80	Morphine sulfate 7 mg.	Very good anesthesia, some movement	V.G.
38	10/26	E.L.	90	Morphine sulfate 7 mg.	Very good anesthesia	V.G.
39	11/2	J.D.	90	Morphine sulfate 7 mg.	Poor anesthesia, much movement	P.
40	11/16	F.	90	Morphine sulfate 7 mg.	Very good anesthesia	V.G.
41	11/23	J.	90	Morphine sulfate* 7 mg.	Required ether during operation to stimulate breathing; very little movement	G.
42	12/7	C.	90	Morphine sulfate 7 mg.	No movement, but patient partially conscious when returned to ward	V.G.
43	12/21	M.	90	Morphine sulfate 7 mg.	Slightly restless	G.
44	1/3/34	G.	90	None	Fairly quiet, but quite resistant	F.
45	1/3	V.K.	90	Morphine sulfate 7 mg.	Noisy and unrelaxed	P.
46	1/25	G.C.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Slightly restless, but made no noise	V.G.
47	2/1	A.G.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Perfect result	V.G.
48	2/8	S.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Perfect result	V.G.
49	2/15	R.W.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Slightly restless, some resistance	G.
50	2/15	D.R.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Spoke occasionally during operation, but was well relaxed and offered no resistance	V.G.
51	2/17	K.	85	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Unrelaxed and noisy, anesthetic supplemented with ether; anesthetist administered carbon dioxide intranasally before operation began because of respiratory difficulties	P.
52	2/24	M.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Moved slightly	V.G.
53	3/1	W.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Narcosis not very deep, but patient non-resistant, very quiet	G.
54	3/1	J.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Deep narcosis, very quiet	V.G.
55	3/5	L.R.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Quiet for about twenty minutes; not very deeply relaxed; struggled for a few minutes toward end	G.

*In cases 41-43, 45-92 and 97, Magendie's solution (16 grains morphine sulfate to 1 fluid ounce of water) was given.

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TABLE 1.—DATA ON CASES STUDIED (CONTINUED)

Case	Date	Patient	Avertin Dosage Mg.	Preliminary Medication	Remarks	Rating
56	3/24	S.	90	Morphine sulfate 7 mg. no atropine	Perfect result, satisfactory relaxation	V.G.
57	3/29	R.	90	Morphine sulfate 7 mg. no atropine	Perfect result, satisfactory relaxation; patient had delirium tremens; cyanotic 5 hours after leaving operating room; stimulant required; wires cut	V.G.
58	4/5	S.	90	Morphine sulfate 7 mg.	Perfect result, satisfactory relaxation	V.G.
59	4/7 #52 2d time	M.	90	Morphine sulfate 7 mg. no atropine	Not completely relaxed, slightly restless	G.
60	4/14	O'C.	90	Morphine sulfate 7 mg.	Not completely relaxed, slightly restless	G.
61	4/14	E.S.	90	Morphine sulfate 7 mg.	Poorly relaxed, talked intermittently, restless	F.
62	4/21	M.F.	90	Morphine sulfate 7 mg.	Excellent, good relaxation	V.G.
63	4/21	H.F.	90	Morphine sulfate 7 mg.	Very good, fairly well relaxed	V.G.
64	5/3	W.B.	95	Morphine sulfate 7 mg.	Very bad fracture, much displacement; anesthetic excellent in spite of necessity for much manipulation	V.G.
65	5/3	F.T.	90	Morphine sulfate 7 mg.	Very bad fracture; excellent anesthesia	V.G.
66	5/10	T.S.	90	Morphine sulfate 7 mg.	Not operated on; 30 minutes after injection patient still awake and very pugnacious (alcoholic)	P.
67	5/17	M.W.	90	Morphine sulfate 7 mg.	Pugnacious and resistant, very little relaxation, hard to handle; retains no memory of operation	P.
68	5/17	P.O'L.	90	Morphine sulfate 7 mg.	Talked rationally throughout operation, very cooperative and agreeable; no pain reported	F.
69	5/24	K.	90	Morphine sulfate 7 mg.	Perfect anesthesia in every respect.	V.G.
70	5/26	A.V.	90	Morphine sulfate 7 mg.	Extremely deep anesthesia	V.G.
71	6/7	F.V.	90	Morphine sulfate 7 mg.	Light anesthesia at start, progressively deeper and perfect at end	V.G.
72	6/9	J.K.	90	Morphine sulfate 7 mg.	Perfect anesthesia and relaxation	V.G.
73	6/21	H.M.	90	Morphine sulfate 7 mg.	Perfect result	V.G.
74	6/21	J.McD.	90	Morphine sulfate 7 mg.	Perfect anesthesia	V.G.
75	6/23	J.W.	90	Morphine sulfate 7 mg.	Perfect anesthesia; cyanotic for several hours	V.G.
76	8/2	G.B.	90	Morphine sulfate 5 mg.	Patient yelled and struggled throughout operation; retains no memory of pain or of his actions	P.

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TABLE 1.—DATA ON CASES STUDIED (CONCLUDED)

Case	Date	Patient	Avertin Dosage Mg.	Preliminary Medication	Remarks	Rating
77	8/2	J.F.	90	Morphine sulfate 5 mg.	Not completely relaxed; anesthesia otherwise perfect	G.
78	8/9	P.F.	90	Morphine sulfate 5 mg.	Made some resistance, noisy	F.
79	8/9	S.A.	90	Morphine sulfate 5 mg.	Not completely relaxed, noisy	F.
80	8/16	A.K.	90	Morphine sulfate 7 mg.	Solution was given by mistake two hours too early; patient never in deep anesthesia, but nicely relaxed and gave no trouble, made no noise	V.G.
81	8/18	R.T.	90	Morphine sulfate 7 mg.	Perfect anesthesia, patient had avertin about one hour before operation started	V.G.
82	9/13	E.R.	90	Morphine sulfate 7 mg.	Not relaxed, whimpering and resistant	F.
83	9/13	J.McC.	90	Morphine sulfate 7 mg.	Not completely relaxed nor anesthetized	G.
84	10/4	G.L.	90	Morphine sulfate 7 mg.	Perfect anesthesia	V.G.
85	10/18	N.McL.	90	Morphine sulfate 7 mg.	Perfect anesthesia; very slight rigidity of jaws	V.G.
86	10/25	S.S.	90	Morphine sulfate 7 mg.	Perfect relaxation	V.G.
87	10/25	B.B.	90	Morphine sulfate 7 mg.	Perfect relaxation	V.G.
88	10/25	W.B.	90	Morphine sulfate 7 mg. & atropine $\frac{1}{150}$ grain	Circumferential wiring; good relaxation, slight resistance and movement	V.G.
89	11/1	K.	90	Morphine sulfate 7 mg.	Perfect relaxation	V.G.
90	11/1	B.	90	Morphine sulfate 7 mg.	Perfect result	V.G.
91	11/8	M.H.	90	Morphine sulfate 7 mg.	Perfect result	V.G.
92	11/8	C.R.	90	Morphine sulfate 7 mg.	Very good; slightly rigid jaws at end	V.G.
93	12/6	S.	90	Pantopon $\frac{1}{6}$ grain	Jaws resistant at end of operation	V.G.
94	12/20	R.B.	90	Pantopon $\frac{1}{6}$ grain	Restless toward end	V.G.
95	12/20	J.W.	90	Pantopon $\frac{1}{6}$ grain	Slight resistance	V.G.
96	1/10/35	P.	90	Pantopon $\frac{1}{6}$ grain	Excellent anesthesia	V.G
97	1/26	O.M.	90	Morphine sulfate 7 mg.	Patient not completely relaxed; weight given did not seem correct in view of patient's size and physique	F.
98	1/31	J.F.	90	Pantopon $\frac{1}{3}$ grain	Patient slightly unrelaxed, but gave no trouble, evidently drug addict	V.G.
99	2/16	E.G.	90	Pantopon $\frac{1}{3}$ grain	Patient was not weighed; jaw not relaxed; anesthesia otherwise successful	G.
100	3/9	K.	90	Pantopon $\frac{1}{3}$ grain	Jaw never completely relaxed	F.

mences her reparative procedure immediately, and unless that process is properly directed by the surgeon as soon as possible after the accident, malunion may result.

Several means have been employed to diminish or abolish the pain caused by manipulation of the fractured parts. The use of sedatives such as bromides is one method. Infiltration with procaine, nerve blocking and general anesthesia have been used. A study of each of these will disclose certain advantages and disadvantages and the limited conditions under which each is applicable.

TABLE 2.—RATINGS IN VARIOUS CASES

Very Good Case			Good Case	Fair Case	Poor Case
8	40	73	4	1	2
9	42	74	6	5	3
10	46	75	13	7	19
11	47	80	23	15	21
12	48	81	41	16	22
14	50	84	43	20	24
17	52	85	49	44	28
18	54	86	53	61	34
25	56	87	55	68	35
26	57	88	59	78	39
27	58	89	60	79	45
29	62	90	77	82	51
30	63	91	83	97	66
31	64	92	99	100	67
32	65	93			76
33	69	94			
36	70	95			
37	71	96			
38	72				

TABLE 3.—CASES RATED AS POOR

Case	Dose Mg.	Medication	Feature
2	70	None	Restless
3	80	None	Noisy, restless
19	80	Paraldehyde 4 drams	Pugnacious
21	80	Paraldehyde 2 drams	Awake
22	80	Paraldehyde 2 drams	Poor anesthesia
24	80	Paraldehyde 2 drams	Screaming, poor anesthesia
28	90	Paraldehyde 4 drams	Noisy, pugnacious
34	80	Paraldehyde 2 drams	No effect, poor anesthesia
35	90	Morphine 7 mg.	Avertin spilled
39	90	Morphine 7 mg.	Poor anesthesia, restless
45	90	Morphine 7 mg.	Noisy and unrelaxed
51	85	Morphine 7 mg. atropine $\frac{1}{150}$ grain	Ether administered, carbon dioxide because of respiratory difficulties
66	90	Morphine 7 mg.	No effect (alcoholic)
67	90	Morphine 7 mg.	Pugnacious and unrelaxed
76	90	Morphine 5 mg.	Noisy and pugnacious

If the amount is sufficient, and provided the patient responds favorably to the action of the drug or drugs, the use of sedatives will be found satisfactory in a limited number of cases. When the is seldom found. The absence of only one of these factors is all that is necessary to turn the whole operation into a prolonged nightmare of agony for both dentist and patient.

TABLE 4.—CASES RATED AS FAIR

Case	Dose Mg.	Medication	Remarks
1	60	Morphine 5 mg.	Memory of operation; light anesthesia
5	65	Morphine 5 mg. & atropine $\frac{1}{150}$ grain	Talking
7	80	None	Noisy and pugnacious
15	80	Paraldehyde 3 drams	Light anesthesia; talkative patient (alcoholic)
16	80	Paraldehyde 2 drams	Talking and restless
20	80	Paraldehyde 2 drams	Talking and restless
44	90	None	Unrelaxed
61	90	Morphine 7 mg.	Poor result; unrelaxed, talkative
68	90	Morphine 7 mg.	Talked constantly through operation
78	90	Morphine 5 mg.	Noisy, resistant
79	90	Morphine 5 mg.	Unrelaxed, noisy
82	90	Morphine 7 mg.	Unrelaxed, noisy
97	90	Morphine 7 mg.	Unrelaxed, weight given seemed to be erroneous
100	90	Pantopon $\frac{1}{4}$ grain	Not completely relaxed

TABLE 5.—CASES RATED AS GOOD

Case	Dose Mg.	Medication	Remarks
4	65	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Seemed to feel slight pain
6	80	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Slight resistance
13	80	Paraldehyde 2 drams	Restless
23	80	Paraldehyde 2 drams	Restless
41	90	Morphine 7 mg.	Required ether to stimulate breathing
43	90	Morphine 7 mg.	Restless
49	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Restless
53	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Nonresistant; anesthesia not very deep narcosis
55	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Very quiet for about 20 minutes
59	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Restless, unrelaxed
60	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Restless, unrelaxed
77	90	Morphine 5 mg. & atropine $\frac{1}{150}$ grain	Not completely relaxed
83	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Not completely relaxed
99	90	Pantopon $\frac{1}{4}$ grain	Patient not weighed; jaw not relaxed

fracture is a simple one with no displacement and the trauma of the surrounding tissues is slight, a careful, gentle pair of hands and a cooperative patient can make the task virtually painless.[1] Unfortunately, such a combination of conditions

Infiltration of the tissues is of little assistance. The gingivae can be anesthetized and adjustment of some of the wires can be made with comfort to the patient. The fracture site itself cannot be so treated, and the chief cause of pain, the

TABLE 6.—CASES RATED AS VERY GOOD

Case	Dose Mg.	Premedication	Remarks
8	80	Paraldehyde 2 drams	
9	80	Paraldehyde 2 drams	Patient seemed to retain memory of operation
10	80	Paraldehyde 2 drams	
11	80	Paraldehyde 2 drams	Patient relaxed for 48 hours; caffeine sodium citrate administered because of coma-like appearance
12	80	Paraldehyde 2 drams	Uneventful case
14	80	Paraldehyde 2 drams	
17	80	Paraldehyde 2 drams	
18	80	Paraldehyde 2 drams	
25	80	Paraldehyde 4 drams	
26	80	Paraldehyde 2 drams	
27	90	Paraldehyde 2 drams	
29	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	
30	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	
31	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	Restless last four minutes
32	80	Paraldehyde 2 drams	
33	80	Paraldehyde 2 drams	
36	90	Morphine 7 mg.	
37	80	Morphine 7 mg.	
38	90	Morphine 7 mg.	
40	90	Morphine 7 mg.	
42	90	Morphine 7 mg.	
46	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	Slightly restless
47	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	
48	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	
50	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	Talking, but relaxed, unresistant
52	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	Moved slightly
54	90	Morphine 7 mg. atropine $\frac{1}{150}$ grain	
56	90	Morphine 7 mg.	
57	90	Morphine 7 mg.	Case of delirium tremens; patient cyanotic for 5 hours after leaving operating room; stimulated and wires cut
58	90	Morphine 7 mg.	
62	90	Morphine 7 mg.	
63	90	Morphine 7 mg.	
64	95	Morphine 7 mg.	Badly displaced bone requiring much manipulation
65	90	Morphine 7 mg.	Badly displaced bone
69	90	Morphine 7 mg.	
70	90	Morphine 7 mg.	
71	90	Morphine 7 mg.	
72	90	Morphine 7 mg.	
73	90	Morphine 7 mg.	
74	90	Morphine 7 mg.	

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TABLE 6.—CASES RATED AS VERY GOOD (CONCLUDED)

Case	Dose Mg.	Premedication	Remarks
75	90	Morphine 7 mg.	Cyanotic for several hours; Magendie's solution given in room 2 hours before operation; patient was never in deep anesthesia, but was relaxed and quiet
84	90	Morphine 7 mg.	
85	90	Morphine 7 mg.	
86	90	Morphine 7 mg.	
87	90	Morphine 7 mg.	
88	90	Morphine 7 mg. & atropine $\frac{1}{150}$ grain	Circumferential wiring
89	90	Morphine 7 mg.	
90	90	Morphine 7 mg.	
91	90	Morphine 7 mg.	
92	90	Morphine 7 mg.	
93	90	Pantopon $\frac{1}{6}$ grain	Slightly resistant toward end
94	90	Pantopon $\frac{1}{6}$ grain	Slightly resistant toward end
95	90	Pantopon $\frac{1}{6}$ grain	Slightly resistant toward end
96	90	Pantopon $\frac{1}{6}$ grain	
98	90	Pantopon $\frac{1}{3}$ grain	Slightly resistant toward end

movement of the fragments, is not affected by injections.

Blocking of the fifth nerve or its branches is sometimes utilized, and, under favorable circumstances, this gives excellent results.[2] One requisite is the absence of edema or inflammation of the soft tissues through which the needle must pass. Very frequently, the landmarks and guides are obliterated and, in mandibular fractures, the posterior fragment is so often displaced that the whole technic of injection becomes nothing but a "guess" or, quite literally, a stab in the dark.

A combination of preoperative medication and nerve blocking will, in certain cases, afford very satisfactory conditions under which to operate. But obviously it is not a procedure that can be employed universally.

General anesthetics such as nitrous oxide-oxygen and ether have been found to possess certain advantages.[3] Because of complete narcosis, the cooperation of the patient is assured. The extreme necessity of delicacy of manipulation, while at all times desirable, is not of such great value. The presence or absence of swelling, soreness, displacement and other symptoms can be disregarded; and these anesthetics are comparatively safe agents and very effective in competent hands. New factors are introduced by the use of general anesthetics. The armamentarium is bulky and apt to interfere with the operative procedures. The length of time required to adjust wires or appliances varies, of course, but only the simplest cases can be completed in less than thirty minutes. The average time is well over twice that, and it requires more than ordinary skill to maintain anesthesia at a satisfactory, even depth for such a long period. By far the greatest drawback is the possibility of postoperative nausea, and this constitutes a serious objection.[4] It is most distressing to the patient, and if unchecked or not disposed of, the vomitus is liable to be inspirated and death may result. Even in moderately nauseated

patients, it is often necessary to sever the connecting wires; which means that all the efforts at reduction have been in vain.

The arch bar and the eyelet technic have been advanced to meet this obstacle, so that, when nausea occurs, the intermaxillary attachments may be removed without detriment to the rest of the appliance. Unfortunately, not all cases are amenable to treatment by these methods, which are unsuitable in many cases of badly displaced bone, in which the pain of reduction is intense and there is the greatest need of the beneficial effects of anesthesia.

In addition, the oral surgeon seeks an agent that can be administered by some other avenue than the nose or mouth—that eliminates the necessity of injecting in or near the affected area and the use of which will not be followed by nausea.

It is at once obvious that none of the drugs previously described meet all the requirements set forth for a perfect anesthetic for oral surgery.

TABLE 7.—RESULTS WHEN LESS THAN NINETY MILLIGRAMS OF AVERTIN WAS GIVEN

With Nothing		With Paraldehyde			With Morphine & Atropine		With Morphine	
Case	Result	Case	Drams	Result	Case	Result	Case	Result
2	P.	19	4	P.	51	P.	1	F.
3	P.	21	2	P.	5	F.	37	V.G.
7	F.	22	2	P.	4	G.		
		24	2	P.	6	G.		
		16	2	F.				
		34	2	P.				
		15	3	F.				
		20	2	F.				
		13	2	G.				
		23	2	G.				
		8	2	V.G.				
		9	2	V.G.				
		10	2	V.G.				
		11	2	V.G.				
		12	2	V.G.				
		14	2	V.G.				
		17	2	V.G.				
		18	2	V.G.				
		25	4	V.G.				
		26	2	V.G.				
		32	2	V.G.				
		33	2	V.G.				

It has been stated that an ideal anesthetic must assure[5] (1) preservation of the physiologic balance of respiration and circulation, with no increase in toxicity; (2) elimination of psychic trauma; (3) insensibility to pain, and (4) relaxation.

The introduction of every new drug raises anew the hope that a closer approach to the ideal has been found. Shortly after avertin rectal anesthesia came into prominence in this country, its possibilities for oral surgery were considered. It was noted that soon after the administration of the drug, the masseter muscles were affected and the jaw readily relaxed. Another very noticeable and agreeable feature was the almost total

lack of postoperative nausea in patients thus anesthetized. These two characteristics appealed strongly in view of their desirability in fracture reduction.

Available literature was void of any specific reference to the use of avertin in oral surgery.[6] Friedman, in 1930, suggested it for facial fracture cases, but did not employ it. There is no further mention of it in dental journals until 1934, when Saunders and Narreau[7] and Robinson *et al.*[8] recorded its use in extractions. By this time, I had reduced forty fractures under avertin. A preliminary report was presented in July of 1934.[9]

In 1931,[10] Maddox, of Australia, published an entire volume on the drug, apparently covering all its uses; but not once does he mention the reduction of facial fractures. The medical profession in this country was divided as to the merits of avertin, and the entire question was a moot one when this series was begun early in 1933. With a realization of the possibilities in fracture work, but, at the same time, an acute consciousness of the risk involved, it was decided to reduce and immobilize a number of fractures in an endeavor to obtain some authentic information.

Avertin (tribromethylalcohol) was produced by Willstatter and Duisberg in 1923. It was first used clinically by Butzengeiger in March of 1926, in Ger-

TABLE 8.—RESULTS WHEN NINETY MILLIGRAMS OF AVERTIN WAS ADMINISTERED

With Nothing		With Paraldehyde			With Morphine & Atropine		With Morphine				With Pantopon	
Case	Result	Case	Drams	Result	Case	Result	Case	Result	Case	Result	Case	Result
44	F.	28	4	P.	49	G.	35	P.	63	V.G.	100	F.
1	F.	27	2	V.G.	53	G.	39	P.	64	V.G.	93	V.G.
					55	G.	45	P.	65	V.G.	94	V.G.
					29	V.G.	66	P.	69	V.G.	95	V.G.
					30	V.G.	67	P.	70	V.G.	96	V.G.
					31	V.G.	76	P.	71	V.G.	98	V.G.
					46	V.G.	61	F.	72		99	G.
					47	V.G.	68	F.	73			
					48	V.G.	78	F.	74			
					50	V.G.	79	F.	75			
					52	V.G.	82	F.	80			
					54	V.G.	97	F.	81			
					88	V.G.	41	G.	84			
							43	G.	85			
							59	G.	86			
							60	G.	87			
							77	G.	89			
							83	G.	90			
							36	V.G.	91			
							38	V.G.	92			
							40	V.G.				
							42	V.G.				
							56	V.G.				
							57	V.G.				
							58	V.G.				
							62	V.G.				

many. It was introduced into England and then the United States a few years later. It is available in the form known as avertin fluid, which is a solution of the crystals in amylene hydrate. This is mixed with a definite quantity of distilled water according to dosage, and administered rectally. The preparation and injection of the drug require close adherence to the manufacturers' instructions and an attention to detail. The dosage is based on the body weight of the patient, the recommended maximum figure being 100 mg. of avertin fluid per kilogram of body weight. The total amount of the drug should not exceed 6 to 8 cc. for women and from 9 to 10 cc. for men. When the drug was first used abroad, larger doses were administered, but as they were held responsible for ill-effects and fatalities, the amounts were reduced.

The manufacturers advise its use as a "basal anesthetic" and suggest that it be supplemented by some other agent, such as nitrous oxide or ether. When it is thus employed, psychic trauma is eliminated and the amount of the adjuvant needed for surgical anesthesia is greatly reduced. In order to study the fullest possibilities of the drug for fracture work, it was decided to use no assisting anesthetic.

Several factors had to be considered in determining the amount of avertin to be used in beginning this series. First, the study was to be confined to one phase of oral surgery; namely, bone fractures, with the exception of incidental extractions. Now how deep an anesthesia was necessary for the successful conduct of this operation? Certainly something beyond the drowsiness induced by sedatives was desired, but there was not the necessity for complete relaxation which obtains in abdominal surgery. Secondly, since one of the chief objections to general anesthesia is postoperative nausea and the incidence of this disagreeable feature is reduced when avertin is used in combination with some other agent, would the use of avertin alone entirely eliminate this condition? This brought to mind the manufacturers' injunction against using avertin as anything but a basal anesthetic. Thirdly, if this advice was to be disregarded, what dosage should be employed? The literature was silent as to this. For

TABLE 9.—ANALYSIS OF TABLES 7-8

Poor		Fair	
7 received 90 mg.	46.66%	8 received 90 mg.	57.1%
8 under 90 mg.	53.33%	6 under 90 mg.	42.8%
2 with no premedication		2 with no premedication	
6 with paraldehyde		1 with pantopon	
6 with morphine		3 with paraldehyde	
1 with morphine & atropine		7 with morphine	
		1 with morphine & atropine	
Good		**Very Good**	
10 received 90 mg.	71.4 %	44 received 90 mg.	77.1%
4 under 90 mg.	28.5 %	13 under 90 mg.	22.8%
2 with paraldehyde	14.2 %	5 with pantopon	8.7%
1 with pantopon	7.0 %	13 with paraldehyde	22.8%
6 with morphine	42.8 %	29 with morphine	50.8%
5 with morphine & atropine	35.7 %	10 with morphine & atropine	17.5%

surgical anesthesia, the recommended maximum dose was 100 mg. per kilogram. Would it be necessary or wise to employ this amount for the type of operation in question? Would anything less be sufficient? Fourthly, would anything of informative value be gained by using avertin as a basal anesthetic?

After due consideration of all the aspects of the question, it was decided to attempt the use of avertin alone as an anesthetic because (1) it was believed that a sufficient depth of relaxation would be obtained; (2) the procedure promised to eliminate postoperative nausea; (3) it would result in the elimination of nasal inhalators and face masks, leaving the operative field free, and (4) its possibilities in the field of oral surgery might best be determined by the omission of all other anesthetic agents.

All of the cases reported in this series (100) were admitted through the fracture service of the dental department of Bellevue Hospital. The first operation was performed in April of 1933 and the last in March of 1935. The object of this study was to ascertain the result of injection of avertin under any and all circumstances. Therefore, the time of admission was the sole determining factor in the selection of cases. Age, sex and type of fracture were not taken into consideration, and the method of immobilization that seemed to be indicated was employed.

Two definite periods of each week, one morning and one afternoon, were set apart for this work. Any fracture patient who was admitted to the hospital long enough before these specified times to be properly prepared was given avertin. No patient was rushed to the operating room; nor was any patient held for a long period in order that the drug might be used. This resulted several times in three cases being handled in one day, and it also accounted for the fact that sometimes intervals of two or three weeks elapsed between administrations of avertin.

Arbitrary standards were formulated in order to classify the results of each administration. A case was considered "very good" if the patient was quiet, with a reasonable amount of relaxation of the jaws and the skin remaining dry and pink throughout the operation, and no postoperative nausea. A rating of "good" was given when there was only slight deviation from the first classification, or if the patient behaved well for the major portion of the time. To be classed as "fair," the requirements were a dry, pink skin, good behavior and fair relaxation for at least half of the operation period. "Poor," of course, covered all the cases that could not qualify under the other headings.

The results of the first few cases were not completely satisfactory, but, at the same time, they were not so discouraging as to preclude further investigation. The attempt was made to eliminate any form of preliminary medication, but it was found that this was a necessary part of the routine. Several agents were employed, among them morphine sulfate, morphine sulfate and atropine, paraldehyde and pantopon.* (Tables 1-9.) Doses of 60, 65, 70 and 80 mg. per kilogram of body weight were used in the first few cases in order to determine what amount of the drug would be satisfactory. (Tables 1-9.) When less than 80 mg. was given, the conditions attained were unsatisfactory in several respects. Relaxation was not complete and the patients were noisy and resistant. A complete list of the cases studied is given in Table 1, with accompanying data. As will be

*Pantopon is not acceptable for "New and Nonofficial Remedies," official list of products acceptable to the American Medical Association.

noted, the amount of avertin employed and the kind and dosage of the preliminary medicaments used were changed several times. In the first few cases, there was no premedication, but it was soon apparent that a sedative was necessary.

Of the total number of cases, an analysis under the various ratings (Table 2) shows that 57 per cent were very good, 14 per cent good, 14 per cent fair and 15 per cent poor. The percentage of satisfactory cases, therefore, was 71, to 29 failures.

In the study of the fifteen cases rated under poor (Table 3), eight, or 53.3 per cent, of the patients were given less than 90 mg. of avertin. Five of these were given premedication with paraldehyde and two had no premedication. Of the seven that received 90 mg., six had morphine prior to the administration of avertin.

Table 4 lists fourteen cases which received a rating of fair. Eight, or 57 per cent, had a dosage of 90 mg. and 42 per cent less than this amount. Seven, or 50 per cent, had morphine alone as a premedicament. In this group, one patient had morphine and atropine; and in the prior group, rated as poor, only one case was included in which both morphine and atropine were used.

Of the number which are included under Table 5 and which received a rating of good, ten, or 71 per cent, received a dosage of 90 mg., six, or 42 per cent, of the fourteen were given morphine alone, and five, or 35 per cent, were given morphine plus atropine.

Of those that received a rating of very good (Table 6), forty-four, or 77 per cent, of a total of fifty-seven were given 90 mg. of avertin as compared with 22 per cent, or thirteen, that were given less than 90 mg. Morphine alone was the premedicament in twenty-nine cases, or 50 per cent of the group. Paraldehyde was next with 22.8 per cent, followed by morphine and atropine with ten cases, or 17.5 per cent, and pantopon with 8.7 per cent.

Table 7 shows the cases in which less than 90 mg. of avertin was the premedicament employed and the rating given. Table 8 shows the same data for cases in which 90 mg. of avertin was administered. Table 9 is an analysis of Tables 7 and 8 under their various ratings.

A study of the data would justify certain conclusions for this series. Premedication is necessary. A dosage of 90 mg. of avertin seems to be the minimum amount.

The combination of 90 mg. of avertin preceded by morphine and atropine produced the best results. The results of administering paraldehyde prior to avertin, while excellent in some cases, were too variable. In nine of the twenty-four cases thus handled, failure was the result. Morphine alone has the same disadvantage, thirteen of the forty-eight cases being rated as poor or fair. Only two of the seventeen cases in which morphine and atropine were given were rated as poor or fair, and both of the patients received less than 90 mg. of avertin.

Pantopon shows good percentages, but the cases (seven) in which it was given are too few to form a basis of any definite conclusions. Further study of this drug might prove valuable.

The total number of cases studied is of course too small to allow any definite pronouncement on the value of avertin as an anesthetic in oral surgery. Several strongly favorable points were that (1) psychic shock incidental to reduction of fractures was entirely eliminated; (2) even in the few instances wherein the patient seemed to retain some memory of the operation, there was no recollection of pain or discomfort, and (3) in no case was there subsequent nausea. Recovery

was entirely without incident except in two cases, in which cyanosis developed. Pneumonia did not follow operation, and from the patient's point of view, the procedure of reduction and immobilization was generally a quiet interlude. Some of the patients had had previous experiences with broken jaws and were in a position to express an opinion. From the surgeon's side, it proved to be much less laborious and the time of operation was lessened considerably because of noninterference on the part of the patient.

The adoption of avertin as a sole anesthetic is not to be recommended unless much study is given to all phases of the problem beforehand. A competent anesthetist is the first requisite, one who can not only administer the drug but also knows and appreciates its dangers and is able and equipped to cope with any situation that may arise. Respiratory difficulties are the most common obstacles. A valid objection to the use of avertin is the fact that the drug is deposited in the system in one dose. It cannot be shut off as can drugs that are being administered by inhalation. Should any undesirable symptoms develop, it is necessary to introduce antidotes rather than eliminate immediately the cause of the difficulty.

A factor which has not been given much consideration is the tolerance of the patient to the drug. The dosage as suggested by the manufacturers is based almost entirely on the body weight, with little variation because of age, sex or condition. Hunt, of the New Haven Hospital, has modified the technic somewhat by also utilizing the area of body surface in her calculations. The data gained by this study might be interpreted as meaning that the use of avertin promises fine results in oral surgery, but must be given further consideration.

It was eminently satisfactory in a sufficient number of cases to invite some thought on the part of other investigators, and additional knowledge may be at hand or available at a later date which will overcome some of its disadvantages.

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21 East Fortieth Street.

A FOUR-YEAR STUDY OF STUDENT DENTAL HEALTH SERVICE*

By L. G. WELTY, D.D.S., Oakland, Calif.

IN 1931, a dental survey was begun on the class entering the University of California Dental College in that year. Although many dental surveys of students have been made, including graphs depicting the dental conditions present, no one, to our knowledge, has made a study of a progressive nature showing the changes in conditions from one year to another over a four year period.

Our aim might be termed threefold. First, we were desirous of showing each dental student what conditions were present in his own mouth. Secondly, the faculty wished to have definite statistical evidence of these conditions. Thirdly, we were interested in working toward the correction or solution of the problems brought out through the survey. It was felt that, if the student were examined regularly and advised of conditions present each year, he would become more interested in his oral condition and have a greater appreciation of the value of dental care.

Carefully made examinations of the student's own mouth tend to inculcate in him more respect for two of the most important phases of dentistry: examination and diagnosis; and it was believed that the association and correlation of the dental, nutritional and medical examinations would tend to make the student more conscious of the interrelation of these three essential phases of health.

In reviewing the literature, we found that many excellent papers have been written on the subject of dental examinations and dental conditions as revealed by clinical and roentgenographic studies.

Guy S. Millberry[1] made a very comprehensive study of dental conditions among children in the Hawaiian Islands in which he graphically shows the conditions present.

P. J. Brekhus[2] made a very interesting study on the loss of human teeth.

Joseph T. Cohen[3] investigated caries in children of school age.

Thompson[4] reports an interesting survey by Grey on students at Carleton College (one year).

Fosket,[5] of Northwestern University, states that he examined and recorded the findings on dental students at that institution for one year.

Blauch[6] mentions the report of the Harvard University Dental Health Service.

These reports very successfully show the existing conditions, but do not relate the changes that actually occurred over a period of years. Consequently, it was decided to examine the members of each class as they entered our institution and

*With a statement on the scope of the medical examination by Saxon T. Pope, Jr., M.D., and a commentary on food habits by Nina Simmonds, Sc.D., San Francisco, Calif.

(Read before the Section on Histology, Physiology, Pathology, Bacteriology and Chemistry (Research) at the Seventy-Eighth Annual Session of the American Dental Association, San Francisco, Calif., July 15, 1936.)

to repeat the examination every year throughout the four years.

Although the purpose of the survey at first was to improve the dental health service, as the study was carried on from year to year other objectives began to take shape.

OTHER OBJECTIVES OF STUDY

1. *A Basis for Research.*—This class, although small, will serve as a group to refer to for comparison as future classes graduate. Caries susceptibility, for instance, will be compared with that of other classes who will have had nutritional advice and better counsel on physical care. This study, because only a limited group is concerned, will probably not present any conclusive evidence, but, in relation to other surveys conducted on similar lines, it may be a means of showing results of a comparative nature that will be of value.

2. *The Health Problem.*—We found in many cases that students entering college had never had a full mouth roentgenographic examination. In many instances, the roentgenograms revealed serious disturbances that neither student nor examiner could have discovered in any other way. When these conditions are pointed out to the student, his interest is, we believe, stimulated, not only as to his own mouth but also regarding the mouths of his patients. The student becomes more cognizant of the entire health problem.

We believe that an undergraduate should become more familiar with the interrelation of medical and dental science. Certainly, there is much in common between the medical and dental sciences, and the college training period seems the logical place for this relationship to be emphasized. Allen,[7] in "Relationship of Medicine to Dentistry," says: "Dentistry should also be an integral part of medicine. In actual practice, they should not be separated any more than, for example, dermatology and medicine. I am not interested here in the controversy regarding education of den-

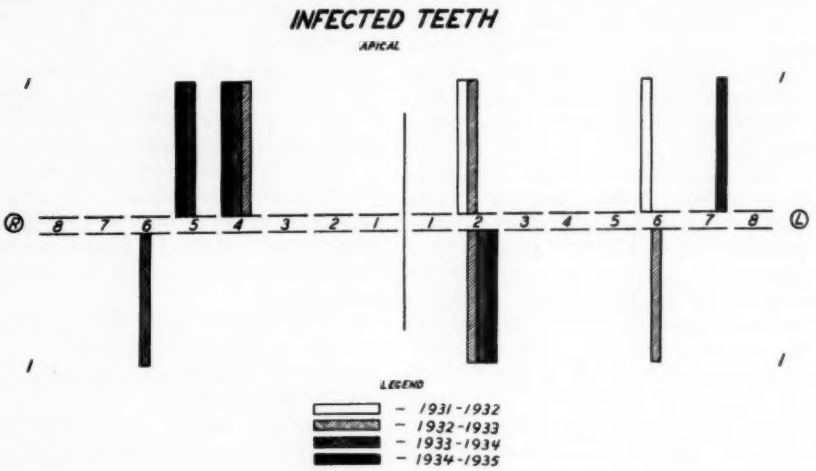

Figure 1.

tists, but I am interested as every dentist and physician should be in the practical and utilitarian cooperation of these two branches of healing." Such cooperation stimulates the student to carry on the work of determining the etiology of caries and paradental disturbances. We have found that the students are particularly interested in learning to read and apply their knowledge of roentgen rays

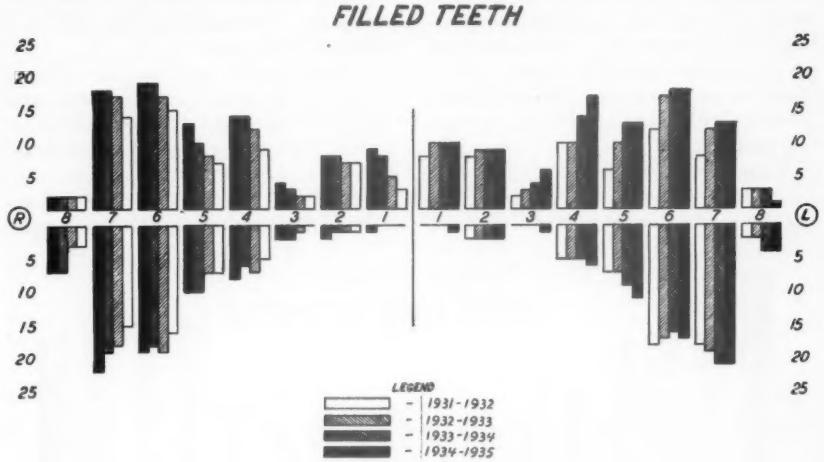

Figure 2.

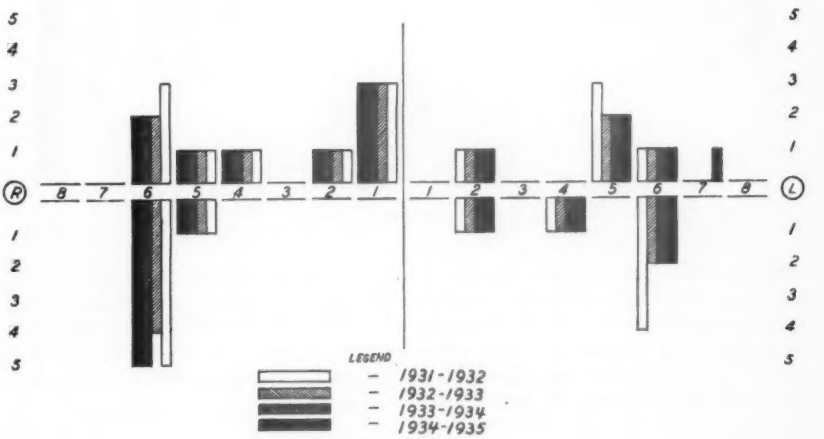

Figure 3.

to their own mouths for the detection of cavities. A decided interest is shown in regard to infection, impacted teeth and bone structure. These examinations bring out and make applicable many of the theories presented in the lecture hall.

To summarize: We believe that a dental consciousness is developed that is beneficial to the student during the training period.

This report is limited to the study of twenty-six students from 1931 to 1935, ranging in ages from 18 to 27 years, or averaging 21 years of age as freshmen. Each year, the entire student body is examined so that each class may be studied and a summary made from year to year. This class was examined as freshmen and each year thereafter until they graduated, in 1935. The examinations were made in the demonstration rooms at the dental college building. Students assisted in the charting, while an instructor made the examinations. The students commented on the fact that their knowledge of roentgen-ray reading and cavity detection was improved by the experience of helping with each year's examination. An hourly fee was paid each assistant in this work.

Special charts to meet the requirements of the yearly examinations were designed. (Figs. 8 A and 8 B.) The first, or freshmen, year, each student is required to have a full mouth roentgen-ray examination (fourteen films). At the beginning of the junior year, bitewing films are taken. Both sets of pictures are made at the nominal student rate. Beginning July 1, 1936, all necessary roentgen-ray examinations will be given free as part of the student health service.

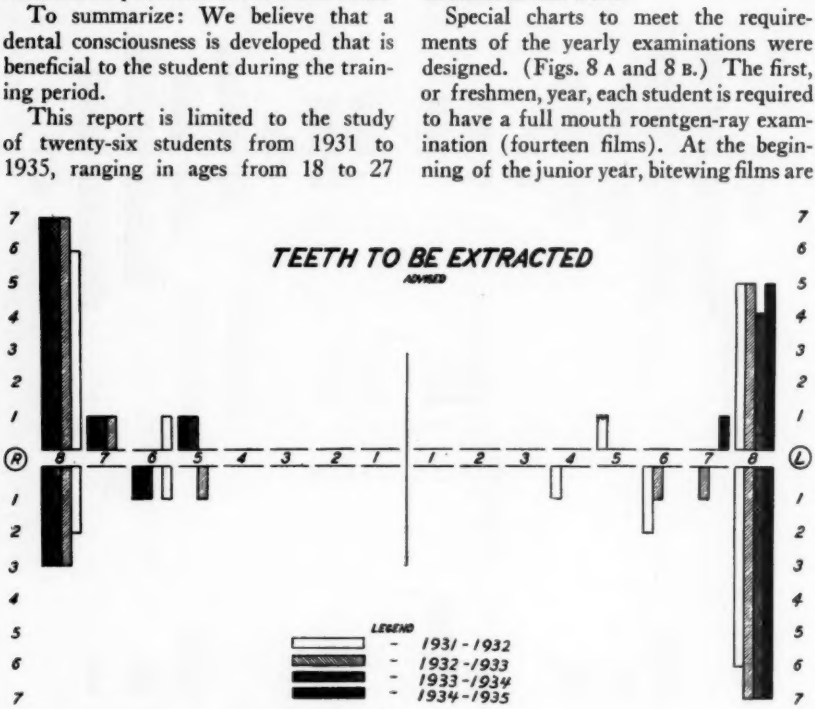

Figure 4.

EXPLANATION OF NOTATIONS

1. Focal infection, either apical or local, is noted and recorded each year.

2. Filled teeth are charted and fillings are noted. These two items are indicated

separately because all fillings in a tooth may eventually coalesce into one filling or crown making one filled tooth. The fillings and filled surfaces are recorded separately so that Bödecker's[8] caries index can be utilized. Although this work began just previous to publication of Bödecker's report, our records were such that this could easily be used in computing the life caries index.

3. Pulpless teeth are recorded. If root-canal work is inadequate, the student is advised to consider refilling of the root canal, apicoectomy or extraction. A discussion with the student on the subject of his pulpless teeth is often advisable.

4. Teeth to be extracted are noted and discussed with each student. These include, as a rule, pulpless teeth, infected teeth, impacted teeth, badly broken down teeth and, rarely in this age group, paradentotic teeth. The graphs show a relationship between teeth to be extracted and missing teeth as the examinations continued.

5. Carious teeth evoke much interest from the student. The full mouth roentgen-ray examination in the freshmen year reveals some rather startling conditions in regard not only to caries but also the generally inferior quality and type of work found in most mouths, a point which Fosket sets forth in his paper on examination of students at Northwestern University for the year 1933-1934. It seems that the dental work found in youth of this age is on the average far from satisfactory. On our charts, the carious teeth are marked in blue pencil,

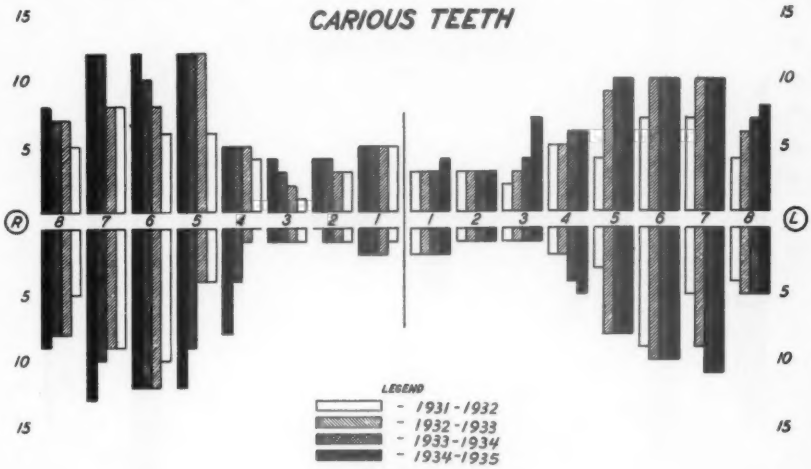

Figure 5.

the outline of each cavity being made to correspond to the approximate outline of the finished filling. A tooth previously filled in which recurrence of caries has begun has a blue line drawn around the red filling, this indicating that replacement is necessary.

The notations are made with the thought that all information will be utilizable in Bödecker's caries index compilation, as well as in our own study. The bitewing film taken at the beginning of the junior year helped the clinical exam-

iner immeasurably in the detection of cavities. Many students, after realizing the importance of the study to themselves, elect to have full mouth or bitewing roentgenograms taken each year. When impacted, unerupted or pulpless teeth are involved, more frequent roentgen-ray examinations are advised in some cases. We do not try to make a comparison between the number of cavities found without and with roentgenograms. We believe that the educational institutions of today have taken for granted for

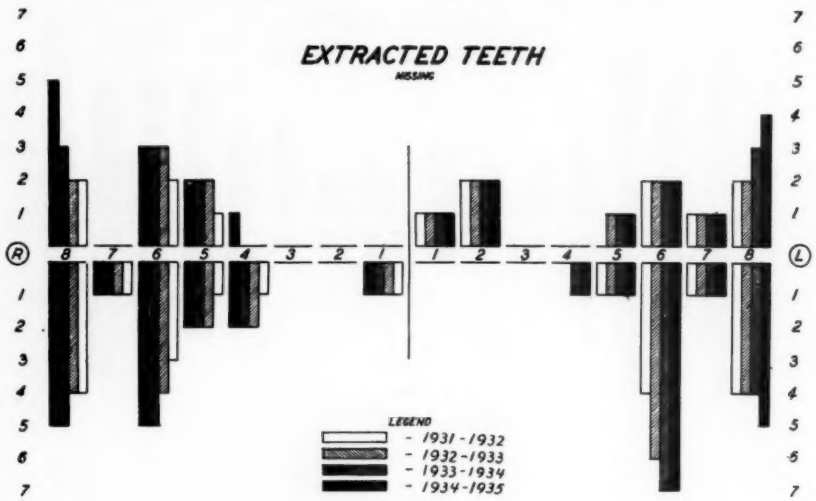

Figure 6.

a number of years that roentgenograms are indispensable to accurate examination and diagnosis. The experience gained in cavity detection with roentgen rays should have a tendency to increase the thoroughness with which the students now in school will perform their duties as dentists.

Wherever there is any doubt regarding a carious area, a separator is resorted to. Wherever a break in the enamel appears on a tooth surface that can be detected with a sharp explorer, the area is considered carious. That this procedure is justified is evidenced by progression of the great number of carious areas barely discernible roentgenographically in the freshmen year to definite involvement of the dentin. In caries susceptible mouths, these areas of decalcification spread rapidly. In the less susceptible mouths, there is slow progress into the dentin. In a very few cases of practically caries-free mouths, the progress is so slight that filling of the areas is not recommended between the freshmen and senior years. As apparently no further decalcification of the interproximal spaces took place during the four years' period in college, only filled teeth with definite decalcification or decay occurring around the margins were charted for replacement. In such cases, the area or areas are considered carious. Obviously, a small percentage of these defects may have been due to faulty dentistry. A restoration that is defective, because of the operator's

negligence, but not carious, is not indicated on the charts for replacement; although it is often suggested that this would be advisable. In other words, a filled tooth must show a carious area to be included in the charting and indexing. The Bödecker index chart is, in my opinion, one of the finest means yet evolved for studying the progress of dental caries. If more general use were made of Bödecker's modified caries index compilation method, much more accurate information would be forthcoming on the subject. As Dr. Bödecker points out, a patient is interested to compare the caries index percentage of one year with that of another and to learn what can be done to check the progress of caries. To say the mouth is in poor, fair, good or excellent condition means very little. A comparison of the relative caries index with the average of this age group will give the examiner a definite idea of the progress of the condition.

6. Missing teeth are recorded as such in contradistinction to congenitally missing teeth. The term "missing teeth" means extracted teeth in this survey. This notation included all of the teeth missing for various reasons. A few were lost through accident, some from being impacted, a few from paradentosis. Most teeth were missing because of caries, loss of vitality, pulp canal work, infection and consequent extraction. This classification has a bearing on the caries index relationship, unless the teeth were lost through accident or paradentosis.

Figure 7.

7. Congenitally missing teeth are charted to show which teeth were most likely to fall under this classification.

8. Supernumerary teeth are noted and their location recorded in an effort to learn whether there is any uniformity in

the distribution of such abnormalities.

9. Impacted teeth are charted and graphically shown. It was thought that the nutritional history, with its influence on bone development, might throw some light on the susceptibility to impaction, especially if a large group is studied.

10. Deciduous teeth are noted that we may determine the location and also discover any relation there may be to congenitally missing teeth and malocclusion.

11. The care of the mouth is noted from year to year, whether improvement or retrogression. Whenever it is indicated, a brief discussion of the subject is held with the student. As the summary reveals, the care of the mouth of the freshman is poor, and as the student becomes more interested in his dental condition, an improvement was expected, but none was observed. Classification as good, fair and poor is considered ade-

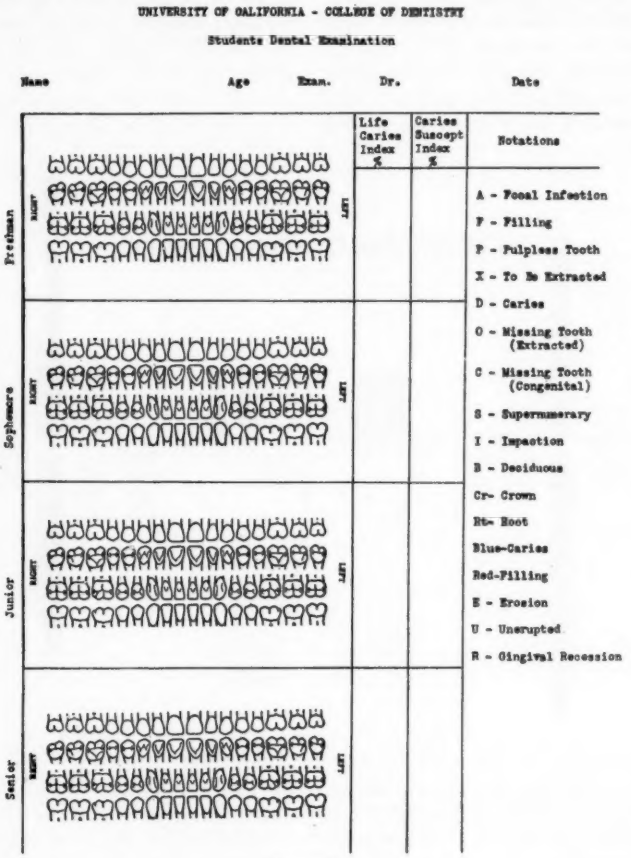

Figure 8 A.

quate, although perhaps no two would agree as to what each term means as regards mouth care.

12. The number of brushings per day is recorded each year, and if the number per day increased, but the gingival condition became worse, inquiry was made as to the amount of time spent and other possible causes of the apparent lack of effectiveness in the method. Suggestions are often made that should not be necessary in the instance of some of the upper classmen, especially seniors ready to graduate. It seems that in many cases a student can advise his patients in the care of the mouth, but cannot apply this advice in his own case.

UNIVERSITY OF CALIFORNIA - COLLEGE OF DENTISTRY

Students Dental Examination

Name Parentage Date

	Freshman	Sophomore	Junior	Senior
1. X-rays				
A. Full Mouth				
B. Bite Wings				
2. Care of mouth				
A. Good				
B. Fair				
C. Poor				
3. Brushings per day				
4. Gingival Tissues				
A. Paradentitis				
B. Preparadentotic				
C. Paradentosis				
D. Atrophy				
E. Hypertrophy				
5. Calculus				
A. *				
B. **				
C. ***				
6. Erosion				
7. Bone Structure				
A. Normal				
B. Osteoporotic				
C. Osteodystrophic				
D. Osteosclerotic				
8. Occlusion				
A. Normal				
B. Malocclusion				
1. Neutro occ.				
2. Disto occ.				
a. Unilateral				
b. Bilateral				
3. Mesio occ.				
a. Unilateral				
b. Bilateral				
9. Facial Form				
A. Normal				
B. Abnormal				
10. B. M. R.				
11. Nutritional Status				
A. Ex.				
B. Good				
C. Average				
D. Fair				
E. Poor				

Remarks

Figure 8 B.

13. The occlusion is checked according to Dr. Lischer's suggestion for classification. Few orthodontists care to be specific as to what may be called normal occlusion, but, in general, we apply the

term to all the cases wherein teeth are present in correct centric balance.

By neutroclusion, we mean that there is a correct mesiodistal relationship of the jaws and arches as is usually indicated by the correct locking of the first permanent molars, but with possible cross-bite, overjet, overbite or irregularities of the individual teeth.

The "distoposition" of the mandible to the maxillae is designated as distoclusion. This relationship of the lower to the upper first molars may be unilateral or bilateral.

The mesial relation of the mandible to the maxillae is designated as mesioclusion. This also may be unilateral or bilateral.

Facial form is recorded as either normal or abnormal, the latter being generally associated with the more extreme classifications of malocclusion.

14. The nutritional status of the student as listed on the chart includes the brief classification of excellent, good, average, fair and poor. This evaluation cannot possibly include a satisfactory dietary summary. The detailed nutritional examination and record is made by Dr. Simmonds, whose work has been outstanding in this field. A notation is included in the charts in order that the dental examiner may obtain a general idea in regard to nutrition without referring to detailed records. In this way, the caries index can be scrutinized in relation to the nutritional status.

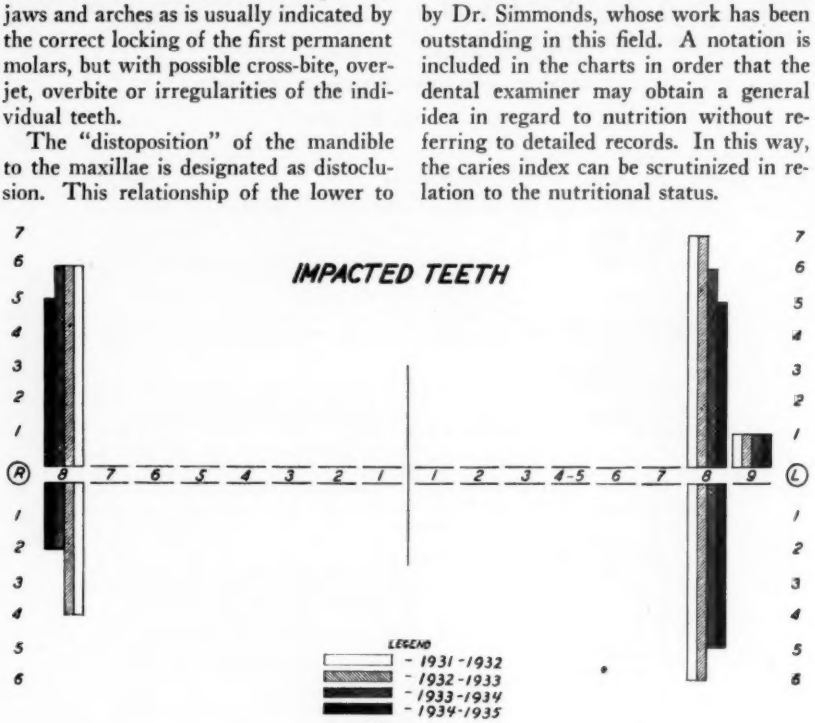

Figure 9.

15. A basal metabolic rate test is made in some cases wherein faulty metabolism is suspected. At present, this is not a general procedure, but in the near future it is hoped that it may be made a routine part of the student examination.

The basal metabolic rate study in relation to the caries index, caries susceptibility index, nutritional status, bone condition and general physical health may reveal features of correlation that should prove of interest.

16. Bone structure is a subject that

has evoked attention. The x-ray department has done much to standardize the procedure of technic in order that pictures shall be uniform. This uniformity affords an opportunity to compare and study the bone picture in groups of students from year to year. As yet, the general classification, as far as the student examinations are concerned, includes only what is termed normal, osteoporotic, osteodystrophic and osteosclerotic bone. The gingival conditions are classified as normal, paradentitic, paradentotic, atrophic and hypertrophic.

ranging from 7.5 to 37.5 per cent. Between the freshmen and sophomore years, the average caries susceptibility index was 3.678 per cent. From the sophomore to the junior year, it dropped to 2.01 per cent; and from the junior to the senior year, it rose to 3 per cent.

Each graph and table of corresponding number will be briefly described.

1. The graph on infected teeth (Fig. 1) shows the distribution of abscessed or infected teeth. In a limited number of students, this graph is not conclusive.

2. The graph on filled teeth (Fig. 2)

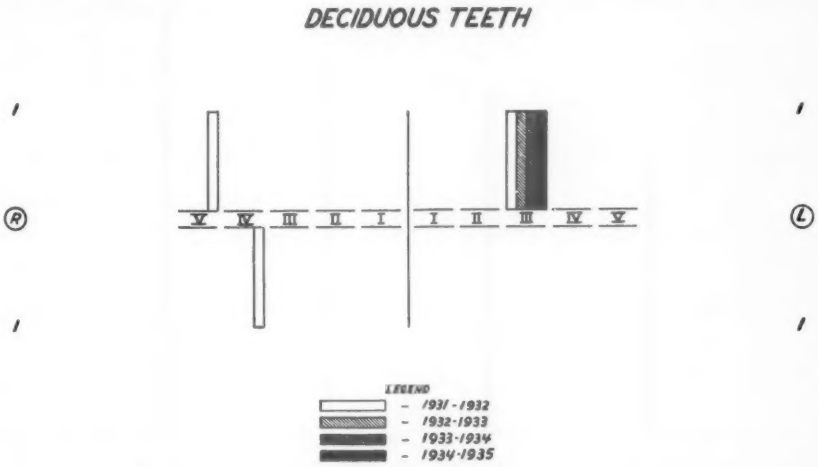

Figure 10.

RESULTS

The results of the yearly examinations of one class from matriculation to graduation present many points of interest. The first detail that comes to our attention is that the life caries index seems rather high in the freshmen year. This, in itself, is not unusual, but the fact that the caries susceptibility index rises rapidly each year is extremely alarming. The average life caries index (Table 11) for the freshmen class was 17.187 per cent, shows a definite uniformity of susceptibility of certain teeth to caries. The upper and lower first and second molars are the most susceptible. The lower right molars are filled more often than the left molars, which perhaps is due in part to toothbrushing habits, as most people are right-handed, and therefore find that brushing the right side is awkward. A further discussion of the figures will not be made, as the chart itself is, we believe, self-explanatory.

3. The graph on pulpless teeth (Fig. 3) indicates the relative tendency of the teeth to become pulpless. This chart, together with one on missing and carious teeth, emphasizes the frequency with which the lower right first molar is subject to caries, loss of pulp and extraction.

4. The graph on teeth to be extracted (Fig. 4) indicates primarily that the third molars are most frequently subject to extraction in this age group. A large percentage of the third molars were impacted and removal was advised.

5. The carious teeth graph (Fig. 5) is perhaps the most interesting in that it shows from year to year which teeth become carious. If this graph included carious areas instead of carious teeth, it would be more striking. Here again we have the upper and lower right molars most susceptible to caries. This graph shows a higher incidence of caries each year, reaching the maximum in the fourth year. We have had difficulty in obtaining cooperation from the students in having dental work done from year to year; a point that will be stressed later.

6. The missing teeth graph (Fig. 6) indicates which teeth were missing when the student entered college, and which teeth were removed during the four years; but because of the limited number of students investigated, no conclusions can be drawn.

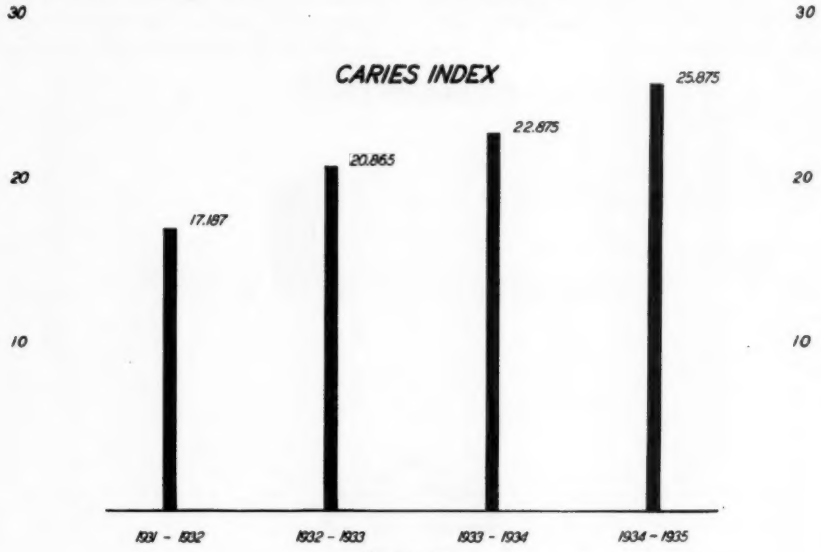

Figure 11.

7. The graph on congenitally missing teeth (Fig. 7) reveals that the upper lateral incisor, cuspids and third molars are those most likely to be congenitally missing.

8. A graph was not made of supernumerary teeth, as only one, an upper left fourth molar, was found. (Table 8.)

9. The graph on impacted teeth (Fig. 9) indicates that the upper right, upper left and lower left third molars are most frequently impacted.

10. The deciduous tooth graph (Fig. 10) shows only three deciduous teeth, two of which were removed during the four years.

11. The care of the mouth in the first year may be summarized as: 27 per cent good; 46 per cent fair, and 27 per cent poor. These percentages unfortunately did not change much during the four years. (Table 12.)

12. Brushing in the freshmen year averaged 1.53 times a day, increasing to 2.11 in the senior year. (Table 12.)

The summary on occlusion is self-explanatory. (Table 12.)

TABLE 1.—INFECTED TEETH

No. of Students	Class	Palmer Notation of Infected Teeth																				Total Infected Teeth	Average Infected Teeth per Student
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8					
26	Freshmen 1931 1932	R										1				1			L			2	0.075
26	Sophomores 1932 1933	R					1					1							L			4	0.153
												1				1							
26	Juniors 1933 1934	R				1	1												L			4	0.153
					1							1											
26	Seniors 1934 1935	R				1	1										1		L			4	0.153
												1											

The most startling fact brought out by the study is that the caries susceptibility index (Table 11) rises markedly each year that the student is in college. In 1931, this class shows an average of 4.7 carious teeth per student, or 5.8 carious areas per student. Four years later, the same group shows an average of 8.2 carious teeth, or 10.5 carious areas per student. After a greater number of students have been observed, over a four-year period, it is hoped that there may be a more definite correlation between caries susceptibility and nutritional status.

The second point of interest is that, although our records revealed a great number of carious teeth to be filled, only about 25 per cent of the work indicated was completed. The student constantly

COMMENT ON RESULTS

advocates good dental care for his patients, but does not take care of his own defects. Dental education has missed its objective when such deplorable conditions persist throughout the student's college career. Unfortunately, the university cannot make it compulsory for students to have their own mouths taken care of, nor can this be made a prerequisite to graduation. There are two explanations for this neglect on the part of students: lack of time and lack of funds. Many students are self-supporting, or partially so. We are sorry to say that in the past certain students have graduated in whose mouths there were from twenty to twenty-five cavities that needed immediate attention. I bring these points to your attention not in condemnation of the student, but because I believe our dental educational system is at fault in that a plan to alleviate this deplorable state of affairs has not been worked out. At the University of California, we are in the process of formulating a program which it is hoped will remedy this condition. We believe that the majority of students, if they have the opportunity, will gladly have their dental defects taken care of.

TABLE 2.—FILLED TEETH AND FILLINGS

No. of Students	Class	Filled Teeth	Palmer Notation of Filled Teeth																			Total Fillings per Class	Average Filled Teeth per Student	Average Fillings per Student
26	Freshmen 1931 1932	215	R	2	14	15	7	9	2	7	3	8	8	2	10	6	12	8	3	L	254	8.269	9.769
				8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**				
				3	15	16	7	5		1			2		5	7	18	18	2				
26	Sophomores 1932 1933	250	R	2	17	17	8	12	2	7	4	10	9	3	10	10	17	12	3	L	324	9.615	12.461
				8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**				
				3	18	19	7	7	1	1			2		5	6	17	19	2				
26	Juniors 1933 1934	283	R	2	18	19	10	12	3	8	8	10	9	4	14	12	18	13	3	L	371	10.884	14.269
				8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**				
				7	19	18	10	6	2	1			2		5	9	16	21	4				
26	Seniors 1934 1935	308	R	2	18	19	13	14	4	8	9	10	9	6	17	13	18	13	1	L	396	11.869	15.230
				8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**				
				7	22	19	10	8	2	2	1	1	2	1	6	11	17	21	4				

SUMMARY

The four-year student survey revealed a marked susceptibility to caries. The

type of dental work in students' mouths upon entering college was, on the average, inferior in quality. The need for dental service was greater than was anticipated. The necessary dental work in students' mouths was not completed because of lack of funds and time. The care, or hygiene, of the students' mouths was not so good as it should have been in view of the fact that they were about to graduate and practise their profession.

There is, we believe, a definite defect in the system of dental education when students in colleges of dentistry do not make personal application of the instruction they receive and pass on in advice to their patients. Means should be provided whereby students can secure this necessary dental service.

TABLE 3.—PULPLESS TEETH

No. of Students	Class	Palmer Notation of Pulpless Teeth																					Total Pulpless Teeth	Average Pulpless Teeth per Student
26	Freshmen 1931 1932	R				2	1	1		1	3			1				2	1				21	0.808
			8	7	6	5		3	2	1		1	2	3	4	5	6	7	8	L				
					4	1							1		1		2							
26	Sophomores 1932 1933	R				2	1	1		1	3			1				1	2				20	0.769
			8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8	L				
					4	1							1		1		2							
26	Juniors 1933 1934	R				2	1	1		1	3			2				1	1				20	0.769
			8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8	L				
					4	1							1		1		2							
26	Seniors 1934 1935	R				2	1	1		1	3			1				1	1				20	0.769
			8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8	L				
					4	1							1		1		2							

The medical history has covered the racial origin and condition of health of parents and siblings; and the occurrence in the family tree of diseases of strong familial tendency: heart and lung diseases, cancer, rheumatism, obesity,

SCOPE OF THE MEDICAL EXAMINATION*

For the group of students under consideration, the medical examination has been a standard one based on the type employed by life insurance companies.

*By Saxton T. Pope, Jr., M. D.

goiter and nervous disorders. Residences, past illnesses, accidents, operations, marital history and immunizations were all recorded; with a notation about habits as to tobacco and stimulants, and recent changes in weight. In the case of women, the menstrual history was required. These details were filled out by the students themselves on mimeographed forms supplied by the medical examiner.

The examination has included the following points: height, weight, blood pressure, general appearance and condition of skin and mucous membranes; head, neck, thorax, lungs, cardiovascular system, abdomen, back, extremities and reflexes. Special examinations have been added, notably those of the eye by the eye clinic; and of the spinal column and feet by the orthopedic clinic. A summary of defects has been made, with recommendations as to treatment.

In its inception, this type of medical examination was intended primarily to uncover those defects that might incapacitate the student for continuation of his dental studies. As such, it sufficed perfectly. Gradually, the interest advanced. It became evident that an understanding of the relation of the dental problem to

TABLE 4.—TEETH TO BE EXTRACTED

No. of Students	Class	Palmer Notation of Teeth to Be Extracted																					Total Teeth to Be Extracted	Average Teeth to Be Extracted per Student
26	Freshmen 1931 1932	R	6		1												1			5	L		25	0.962
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8						
			2		1									1		2		6						
26	Sophomores 1932 1933	R	7	1														5	L		26	1.000		
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8						
			3			1										1	1	7						
26	Juniors 1933 1934	R	7	1		1												4	L		24	0.923		
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8						
			3		1													7						
26	Seniors 1934 1935	R	7	1		1											1	5	L		26	1.000		
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8						
			3		1													7						

the medical might best be fostered by demonstrating that relation in the person of the student himself. Further, since it has been decided to incorporate elements of medical instruction in the teaching of the dental school, the type of history taking was altered. The history was taken by the medical examiner, and amplified. organic defects, but, in addition, kept a watchful eye for glandular imbalance and signs of disordered mineral metabolism. The physical signs of rickets, for instance, are fairly definite, even in their slightest degree.

Thus, the scope of the physical examination has been augmented. The desire

TABLE 5.—CARIOUS TEETH AND CAVITIES

No. of Students	Class	Carious Teeth	Palmer Notation of Carious Teeth																							Total Cavities per Class	Average Carious Teeth per Student	Average Cavities per Student
26	Freshmen 1931 1932	124		5	8	6	6	4	1	3	5	3	3	2	5	4	7	7	4		152	4.769	5.846
			R	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	L			
				5	9	10	4		1	1	1	2	1	1	2	3	9	5	4				
26	Sophomores 1932 1933	168		7	8	8	12	5	2	3	5	3	3	3	5	9	10	10	6		193	6.462	7.423
			R	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	L			
				8	9	12	4	1	1	1	2	2	1	1	2	8	9	11	5				
26	Juniors 1933 1934	192		7	13	10	12	5	3	4	5	3	3	4	6	10	10	10	7		208	7.384	8.000
			R	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	L			
				7	10	12	9	4	1	1	2	2	1	1	4	8	10	11	5				
26	Seniors 1934 1935	214		8	12	12	12	5	4	4	5	4	3	7	6	10	10	10	8		275	8.230	10.577
			R	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	L			
				9	13	12	12	8	1		2	2	1	1	6	8	10	11	5				

Questions were added relating to the internal glandular balance and the normal physiologic functions of heart, lungs, digestive system, urinary system and organs of special sense. This, in conjunction with the dietary survey, gave a fairly broad historical background. The technic of physical examination remained much the same. It still observed basic for the future is to make it as illustrative as possible of the physical sources for dental defects. It is desired further to keep it serviceable as basic data for research into some of these problems. It is hoped that it will help to demonstrate to the student present methods of physical diagnosis. Every attempt has been made to give the student a sense of ease and in-

formality. Under the present arrangements, dental and medical education are close enough to give the dental student an awareness of medical problems and a sense of the insecurity of health. If the union between the dental and medical schools were closer, the dental student might pass through this stage into one of comparative mental security. As it is, he is subject to myriads of doubts and misgivings. A large fraction of the complaints met by the examiner have indicated anxiety regarding physical health.

It is a subsidiary desire of the present medical examiner to lessen the number of these as much as possible.

Table 6.—Extracted Teeth (Missing Teeth)

No. of Students	Class	Palmer Notation of Extracted Teeth																				Total Extracted Teeth	Average Extracted Teeth per Student
26	Freshmen 1931 1932	R	2		2	1					1	2				2	1	2	L	34	1.308
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8			
			4	1	3	1	1			1					1	4	1	4			
26	Sophomores 1932 1933	R	2		3	2					3	2			1	2	1	2	L	42	1.616
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8			
			4	1	4	2	2			1					1	6	1	4			
26	Juniors 1933 1934	R	3		3	2					1	2			1	2	1	3	L	44	1.692
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8			
			5	1	4	2	2			1				1	1	7	1	4			
26	Seniors 1934 1935	R	5		3	2	1				1	2			1	2	1	4	L	53	2.038
			8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8			
			5	1	5	2	2			1				1	1	1	1	5			

Comments on Student Food Habits as Observed in this Study†

Even under the best of conditions, any conclusions drawn from dietary studies on persons can be only a by and large estimate of what they have eaten. A moment's thought makes it clear that such deductions could not be otherwise. Unless persons in institutions are under extremely close supervision, there will be "trading of dishes," which, of course, in some instances, may not make any change in the outcome of the study (which would depend on the regularity with which certain dishes were traded). So, in work

†By Nina Simmonds, Sc.D.

such as is being reported, the nutrition phase cannot be accurate, but only a general estimate of what the nutritional status of the individual case has been.

If one is thoroughly familiar with the dietary properties of foods, has a fair knowledge of regional and racial food habits and understands the conditions that influence the dietary habits of persons, it is possible to gain some understanding of the relation of the nutrition to dental conditions, provided too many other conditions having an effect on the mouth and teeth have not been present.

That nutrition is not the only complication in the student's dental problems no one would deny, but that certain of the problems are aggravated by unsatisfactory nutrition is undoubtedly true. Physicians know that failure of assimilation of the dietary elements may be brought about by numerous conditions, and unquestionably overfatigue is one of these. That students, for any one of a number of reasons, do not take an adequate amount of rest is obvious; and chronic fatigue is one of the underlying causes of malnutrition in school children. Is this equally true of college students?

The studies reported show clearly that,

TABLE 7.—CONGENITALLY MISSING TEETH

No. of Students	Class	Palmer Notation of Congenitally Missing Teeth	Total Congenitally Missing Teeth	Average Congenitally Missing Teeth per Student
26	Freshmen 1931 1932	R 3 1 1 / 8 7 6 5 4 3 2 1 ‖ 1 2 3 4 5 6 7 8 / 4 L 4 1 1 3	18	0.692
26	Sophomores 1932 1933	R 3 1 1 / 8 7 6 5 4 3 2 1 ‖ 1 2 3 4 5 6 7 8 / 4 L 4 1 1 3	18	0.692
26	Juniors 1933 1934	R 3 1 1 / 8 7 6 5 4 3 2 1 ‖ 1 2 3 4 5 6 7 8 / 4 L 4 1 1 3	18	0.692
26	Seniors 1934 1935	R 3 1 1 / 8 7 6 5 4 3 2 1 ‖ 1 2 3 4 5 6 7 8 / 4 L 4 1 1 3	18	0.692

in most instances, students have more tooth decay at the end of the senior year than they had in the freshman year. What changes have occurred during the four years in college that could be in part responsible? If good habits of mouth hygiene have been formed prior to leaving home, this factor should not have been changed. Illness, endocrine upsets and other conditions over which one has little control may have complicated the problem, but these could not have been present to a degree which would be constant for the various persons. Conditions that have been constant are in great measure: (1) changed living habits (probable tendency to stay indoors more than before coming to college), and (2) changed food habits, unless the person lives at home during his college days. (Changes in food habits are most marked when the family lives on a ranch and it is impossible for the student to spend most weekends at home.) Not infrequently less fruit, fewer fresh vegetables and eggs and less milk are consumed, and, in many instances, less of whole grain cereals, owing in part to the hurried breakfasts of college students.

In other words, the two changes in a student's life, namely, changed living habits and changed food habits, may mean

TABLE 8.—SUPERNUMERARY TEETH

No. of Students	Class	Palmer Notation of Supernumerary Teeth																			Total Supernumerary Teeth	Average Supernumerary Teeth per Student
26	Freshmen 1931 1932	R	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	1 9	L	1	0.038
26	Sophomores 1932 1933	R	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	1 9	L	1	0.038
26	Juniors 1933 1934	R	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	1 9	L	1	0.038
26	Seniors 1934 1935	R	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	1 9	L	1	0.038

that less vitamins B, C and D and less calcium and, to a certain extent, less protein and phosphorus are taken. Unless male students are very limited in income, they will eat, as a rule, meat and eggs in sufficient amounts; which, together with other foods, will guarantee an adequate intake of phosphorus. This is not necessarily true of women. In the study of many persons' diets, a rather general statement can be made that women tend to consume a smaller quantity of protein than do men; which, in turn, usually means a lower phosphorus intake. Women's diets are not infrequently lower in calcium than men's, owing to a smaller consumption of milk and cheese. Men not infrequently prefer cheese to milk. They may not eat as much as they easily could because of lack of knowledge regarding its dietary value or because they do not think about it. In student boarding houses, cheese is often looked on as an adjunct to the diet and not as part of the protein supply. If it is eaten rather liberally, the cost of the meal is raised considerably. If crackers and cheese were served at the end of a meal, most students would also wish a sweet dessert. The habit of eating sweet desserts is so firmly fixed in our minds that fruit, unless it is served as a sauce with the addition of a cooky or piece of cake, does not seem to many persons to be a dessert. Thus, two

TABLE 9.—IMPACTIONS

No. of Students	Class	Palmer Notation of Impacted Teeth																			Total Impactions	Average Impactions per Student
26	Freshmen 1931 1932	R	6 8 4	7	6	5	4	3	2	1	1	2	3	4	5	6	7	7 8 6	1 9		L 24	0.923
26	Sophomores 1932 1933	R	6 8 4	7	6	5	4	3	2	1	1	2	3	4	5	6	7	7 8 6	1 9		L 24	0.923
26	Juniors 1933 1934	R	6 8 2	7	6	5	4	3	2	1	1	2	3	4	5	6	7	6 8 5	1 9		L 20	0.769
26	Seniors 1934 1935	R	5 8 2	7	6	5	4	3	2	1	1	2	3	4	5	6	7	5 8 5	1 9		L 18	0.692

foods (fruit and cheese), which would be valuable additions to the student's or other person's diet in the form of dessert, are, in many cases, looked on merely as adjuncts that raise the cost of the menus.

When the diet consists largely of cooked foods, not only is vitamin C likely to be low, but also vitamin B. Vitamin B is widely distributed in foods, but it is most abundant in whole grain cereals and whole grain breads. If persons do not care for these foods, there are other ways of increasing the vitamin B content of the diet.

The matter of vitamin D in the student's diet raises the question as to how much vitamin D is derived from sunshine under the ordinary conditions of living. If the ultraviolet rays are most abundant in the sun's rays between the hours of 11 and 2, how many students are in a position to benefit by them? Granted that from 10 to 3, the ultraviolet supply is fairly abundant, higher education and often even grade-school and high-school education do not permit its beneficiaries to profit from the vitamin D in sunshine. Grade-school and high-school children have more time as a rule on Saturdays and Sundays for outdoor play than most college students have, but the question could be raised "Does the growing child

TABLE 10.—DECIDUOUS TEETH

No. of Students	Class	Palmer Notation of Deciduous Teeth	Total Deciduous Teeth	Average Deciduous Teeth per Student
26	Freshmen 1931 1932	R 1 V IV III II I 1 | I II III IV V L	3	0.115
26	Sophomores 1932 1933	R V IV III II I | 1 I II III IV V L	1	0.038
26	Juniors 1933 1934	R V IV III II I | 1 I II III IV V L	1	0.038
26	Seniors 1934 1935	R V IV III II I | 1 I II III IV V L	1	0.038

secure sufficient vitamin D from foods and sunshine?" Since foods are not good sources of vitamin D, it is apparent that unless another source of vitamin D is added to the diet, this dietary factor will be present in an insufficient amount. It is a wise plan to take a small amount of terms have a rather definite meaning. Generally speaking, below average means that foods such as milk, cheese, meats, eggs, fruits and vegetables are (and have been) used in rather limited amounts, most of the food consisting of the cereals and their products, with a minimum of

TABLE 11.—CLASS OF 1934-1935

Student	Age 1931	Parentage	Caries Index 1931 1932	Caries Index 1932 1933	Caries Index 1933 1934	Caries Index 1934 1935	Caries Susceptibility Index Four Years
1	20	Guatemalan	29.375	30.625	34.375	36.875	7.500
2	19	Scotch	9.375	9.375	21.250	22.500	13.125
3	23	Norwegian	11.875	14.375	18.125	20.625	8.750
4	20	Swedish	11.875	15.000	21.875	22.500	11.125
5	22	English	17.500	23.750	25.000	27.500	10.000
6	19	English	15.625	16.250	25.625	27.500	11.875
7	26	Scotch-Irish	26.875	31.250	31.250	40.000	13.125
8	22	Chinese	8.750	8.750	10.000	10.000	1.250
9	22	Japanese	9.375	10.000	11.250	11.875	2.500
10	22	Jewish	37.500	41.250	42.500	50.625	13.125
11	20	English (New Zealand)	31.250	32.050	40.000	42.500	11.250
12	20	Welsh	23.125	25.000	26.875	30.000	6.875
13	22	English-Irish	15.000	16.250	16.875	18.125	3.125
14	20	Norwegian	20.000	26.875	30.625	33.125	13.125
15	18	Swiss	13.125	15.625	20.000	24.375	11.250
16	22	English-Swedish	13.750	15.000	18.750	20.625	6.875
17	20	Irish-German	7.500	12.500	18.125	21.875	14.375
18	27	Scotch	25.625	26.875	31.250	33.125	7.500
19	20	Japanese	11.875	12.050	16.250	18.750	6.875
20	25	Italian	15.000	15.625	16.875	22.500	7.500
21	20	Italian	16.875	18.750	23.750	27.500	11.625
22	23	German	11.875	13.125	15.000	16.250	4.375
23	21	American	12.500	20.000	21.875	26.875	14.375
24	19	German-Swiss	20.625	24.375	24.375	27.500	6.875
25	27	Russian	8.750	9.375	9.375	13.750	5.000
26	25	German	21.875	21.875	23.750	25.625	3.750
Average caries index			17.187	20.865	22.875	25.875	8.688
Average caries susceptibility index				3.678	2.010	3.000	

one of the fish oils or other sources of vitamins A and D.

The question may be asked "What is meant by average, below average and about average nutrition?" Naturally, such terms are used in a relative sense, but when one is familiar with the many factors which enter into nutrition, the the articles above designated. If, for example, the total income of a family of man and wife and three children had never been more than $125 a month and all food had to be purchased, rent had to be paid, clothes purchased, at least a small life and fire insurance carried, etc., it is obvious that, even with extraordinary

management, the above-mentioned foods could not be supplied in very generous amounts, especially if the family lived in a city. A student or individual coming from this family would have a nutritional state below average. If the same family lived on a farm that supplied milk, eggs, meats, some fruit and garden products, the nutrition would be above average. It is recognized that the various foods may be available but not eaten, and this fact must be taken into consideration in a dietary history. In average nutrition, only fair amounts of foods of high nutritive value have been taken, such as, possibly, 1 glass of milk a week, with not much used in cooking, very little cheese, only an egg or two a week, meat possibly twice or three times a week, fruits occasionally and not many vegetables, besides potatoes, turnips and beets. Experience, of course, plays a part in estimating what the nutrition has been, but this soon becomes apparent as one's experience in nutrition work grows. It should be emphasized that supplementing the diet with various food factors is in no sense the same as working with laboratory ani-

TABLE 12.—RECAPITULATION OF AVERAGES AND PERCENTAGES
Twenty-Six Students (1931-1935)

	Freshmen		Sophomores		Juniors		Seniors	
	Total per Class	Average per Student	Total per Class	Average per Student	Total per Class	Average per Student	Total per Class	Average per Student
Infected teeth	2	0.075	4	0.153	4	0.153	4	0.153
Filled teeth	215	8.269	250	9.615	283	10.884	308	11.869
Fillings	254	9.769	324	12.461	371	14.269	396	15.230
Pulpless teeth	21	0.808	20	0.769	20	0.769	20	0.769
Teeth to be extracted	25	0.962	26	1.000	24	0.923	26	1.000
Carious teeth	124	4.769	168	6.462	192	7.384	214	8.230
Cavities	152	5.846	193	7.423	208	8.000	275	10.577
Missing teeth	34	1.308	42	1.616	44	1.692	53	2.038
Congenitally missing teeth	18	0.692	18	0.692	18	0.692	18	0.692
Supernumerary teeth	1	0.038	1	0.038	1	0.038	1	0.038
Impacted teeth	24	0.923	24	0.923	20	0.769	18	0.692
Deciduous teeth	3	0.115	1	0.038	1	0.038	1	0.038
Care of mouth								
Good	26.923		23.077		23.077		34.615	
Fair	46.154		57.692		57.692		38.462	
Poor	26.923		19.231		19.231		26.923	
Brushings	40		56		49		55	
Average per day	1.53		2.15		1.88		2.11	
Neutroclusion	14		14		14		14	
Distoclusion, unilateral	2		2		2		2	
Distoclusion, bilateral	4		4		4		4	
Mesioclusion, unilateral	1		1		1		1	
Mesioclusion, bilateral	5		5		5		5	
Facial form, normal	25		25		25		25	
Facial form, abnormal	1		1		1		1	

mals, but it is believed that a knowledge of a person's food habits is a valuable aid in understanding whether faulty nutrition may be playing a rôle in a dental disorder.

Granted that there may be many factors other than the nutritional one in the tooth decay problem of students, from our work we cannot say that the diet is sufficiently adequate in all dietary elements to rule out the nutritional state as a possible cause of the increase in dental disorders during these years. It would be of interest to know the incidence of decay in a similar age group whose work and indoor habits were entirely different. Apparently, the men in the Navy have a high incidence of dental disorders. Is the same true of the Army?

The fundamentals of an adequate diet are well known. Individuals may, of course, need different amounts of the various food elements, but the essentials are the same for all: only the amounts needed may differ. Hence, it may be that certain persons will not respond to a nutritional program that will be entirely adequate for other persons. There is undoubtedly marked variation in the ability to assimilate or to utilize the various food elements, and thus one person may be in a very good condition on a nutritional program which appears to be below that ordinarily considered adequate. The conditions which govern utilization and assimilation are being given a great deal of study at the present time.

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PROCEEDINGS OF THE SUBSECTION ON DENTISTRY, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (1936)*

The Purpose and Function of an Institute of Clinical Oral Pathology

By THEODOR BLUM, D.D.S., M.D., The New York Institute of Clinical Oral Pathology

AN institute of clinical oral pathology is to act as a research body for the purpose of correlating clinical examinations, x-ray studies and pathologic findings.

It should enable those of moderate means and the poor to receive pathologic examinations in accordance with their financial status.

The institute should form a registry particularly for the collection and study of tumors.

Meetings held at frequent intervals should be arranged to increase the knowledge of physicians, dentists and men in allied professions by presentation of clinical material and practical lectures. The laboratory of the institute must be accessible to those interested in the study of the material collected.

The above suggestions have been successfully put in practice by The New York Institute of Clinical Oral Pathology, now in its fifth year of active work.

Biological Aspects of the Dental Pulp

By RAYMOND GETTINGER, B.S., M.D., The New York Institute of Clinical Oral Pathology

ALTHOUGH an extensive literature has accumulated with reference to the various aspects of the dental pulp, a coordinating synthesis of relevant data is not common. Embryology, anatomy, histology, pathology and physiological chemistry must be correlated in a broad interrelated biological concept.

The fundamental mesenchymal nature of the pulp is evident not only from its origin as a condensation of primitive undifferentiated connective tissue but also from its subsequent reaction in both health and disease. Metaplastic potentialities are prominent and characteristic.

Anatomical peculiarities are integral features which determine many aspects of pulp biology. The cytoplasmic syncytium and the fibrillar reticulum, the ramification of vessels and nerves, the unyielding housing of dentin, and the progressive course of eruption with its concomitant manifestations are factors which must enter into consideration. The opportunities for hyperemia, stasis and thrombosis and their inevitable sequelae are unique. Finally, the ordinary function of the teeth demands flexible reactivity to various stimuli unequaled by any other tissue.

Analysis of physiological and pathological phenomena in the pulp is difficult, and may be attended by confusion because of the natural history of the tissue. Widely disparate agents and noxae may produce changes that are regularly found under ordinary circumstances of involution. Satisfactory interpretation of the morphology of the pulp must be evaluated in full recognition of the factors involved.

The reaction to chemical, physical, bacterial, nutritional and other influences must be considered as being operative in

*Atlantic City, N. J., December 28, 1936.

special tissue and environment. A brief survey can only outline general principles. It is hoped that a more lively interest on the part of workers concerned may extend and clarify the problems.

The Present Status of Pulp Testing

By THEODORE KALETSKY, D.D.S., The New York Institute of Clinical Oral Pathology

THE history of electric pulp-testing was briefly discussed from its first appearance in the literature in 1867 to the present day. The progress in the development of instruments and in the interpretation of the findings was traced. The placing of this subject on a truly scientific basis by the investigations of the New York Institute of Clinical Oral Pathology, and its method of examining and determining the comparative reliability of the various instruments offered the profession, were also briefly discussed.

At the present time, the investigations indicated that the most reliable instrument was one having one electrode to be applied to the tooth and the other to be applied to some other part of the body. All other types of instruments were comparatively unreliable. The importance of the use of a galvanic or direct type of current in preference to alternating current was also stressed. The former gave much more reliable results. The best results in making interpretations were obtained by studying the comparative responses between the tooth in question and the corresponding tooth on the opposite side, which was used as a control. It was found that a tooth could still be normal and respond with a variation of 20 volts from the control tooth. Interpretations were made on the comparative study of the voltages used. The amperage indicator was used only to determine the flow of current when a doubt as to this existed. Single-rooted teeth gave a more consistent response than multirooted teeth. The greater the number of roots, the greater the discrepancy.

The importance of pulp testing in routine examination of the mouth was definitely stressed, together with the rôle it plays in determining the prognosis and treatment of choice in various lesions that present themselves for diagnosis. Its importance in making differential diagnoses in various oral lesions was also stressed, together with numerous observations made in the course of study. Mention was also made of the difficulty in diagnosing inflammatory changes in the dental pulp.

Physical Properties of Colloidal Impression Materials

By E. W. SKINNER, Ph.D., and W. R. KERN, D.D.S., M.S.D., Department of Physics, Northwestern University Dental School

SIX commercial impression materials, two of which contained cellulose fibers, have been investigated (1) as to changes in dimension which occur under varying conditions of humidity and environment, and (2) as to certain mechanical properties under compression.

When the materials were allowed to stand for one hour in a relative humidity of 30 to 40 per cent, the contraction varied from 0.12 to 0.95 per cent, the materials containing fibers exhibiting the least change. When immersed in water for three hours, the same specimens showed a recovery of 0.07 to 0.69 per cent above their original dimensions, the fibrous materials again showing the least change.

Under conditions of 100 per cent relative humidity for three hours, a shrinkage of 0.05 to 0.28 occurred, and on immersion in water, the recovery was approximately 0.06 to 0.44 per cent above the original dimensions. As before, the ma-

terials containing fibers exhibited the least change in dimension.

Flow, proportional limit and compressive strength of all of the materials were investigated under a condition of 100 per cent relative humidity by means of a specially designed plastometer. When tested under an arbitrary load of 10 gm. per mm.^{2}, all of the materials exhibited flow. The proportional limits varied from 11.4 to 24.9 gm. per mm.^{2}, and the compressive strengths were between 16.5 and 30.0 gm. per mm.^{2} No definite effect of the fibers in the materials could be detected in these data.

All observations were made at a constant room temperature.

Relationship Between the Time and Temperature of Vulcanization of Dental Rubber

By P. B. Taylor, A.M., Frank Hovorka, Ph.D., and J. B. Mohler, B. S., Western Reserve University

Specimens of olive base rubber were vulcanized for various periods of time at temperatures of 140° C., 150° C., 160° C. and 170° C. The stress-strain curves, when plotted, show that for the shorter curing times the slope of the stress-strain curve increases in a regular manner up to a maximum value. By assuming that a given slope represented a specific degree of cure, the relationship between the curing time and temperature was established and found to be exponential in nature.

A correction due to the curing effect during the run-up period was calculated and added to the curing time as normally measured. The heat necessary to effect the reaction may be calculated by using the relationship developed and Arrhenius' equation. This calculation seems to indicate that the reaction is of the same nature throughout this temperature range.

The Masticatory Apparatus: An Inductor of Growth of the Bones of the Skull

By Lawrence W. Baker, D.M.D., Harvard Dental School

The present report deals with a continuation of studies begun many years ago on the relation of function to growth of the jaws and cranial bones. Reference was made to the earlier work on this subject (*Internat. J. Orthodontia,* 8:259, May 1922). The recent experiments have been aimed at separating and studying the hereditary and functional growth influences. For this purpose, an embryonic rat mandible, taken by Caesarian section, was transplanted in the mother's hind leg, and was compared with the normal mandible of a litter mate born normally. The extent of growth induced by inherent growth influences only, as compared with the extent of growth induced by inherent influences plus function, was thus illustrated. It was also found that after the peak of prefunctional growth was reached, resorption set in, but only in that part of the mandible (the ramus) where the masticatory muscles were attached. The body of the mandible, which contains the constantly growing incisors, remained, this indicating the strong developmental tendencies in the embryonoid cells of the persistent pulp.

The report also described experiments on bone growth through expanding the dental arch with an orthodontic appliance, using madder-stain as the index of growth. Two adult cats were used, one as a control; adult animals were selected, to insure complete ossification at the start. Madder staining is more deeply marked on calcifying bone than on bone already formed. The experiment showed that the induced bone growth was greater than some orthodontists had believed; that the growth involved not only the bones of the mouth vault but the adjacent bony

structures of the face, and that the greatest growth was found nearest the application of force, *i.e.*, along the principal sutures of the palate, in the floors of the nasal tract and orbits, and in the alveolar process.

Histological Studies on the Occurrence and Nature of the Epithelium in Dental Granulomata

By M. W. McCrea, D.D.S., The University of Rochester, School of Medicine and Dentistry

This report records an attempt not only to study the incidence of epithelium, but also to determine whether it was of a proliferating or a resting type, and also to decide upon the location of the epithelial structures, in sixty serially sectioned dental granulomata.

In removing the granuloma from the root, caution was exercised in order that all periodontal membrane attached to the granulomata might be removed. In doing this, a study could be made on the epithelial cell rests, normally present in this structure. If one considers all the attached periodontal membrane and connective-tissue tags to be part of the granuloma, it must be stated that all granulomata contain epithelium. However, these attached periodontal membranes did not show any indications of an inflammatory reaction, and appeared to be normal.

In this study there were thirty-five specimens, or 59 per cent, in which rests were found in the periodontal membrane, but no epithelium appeared in the areas of inflammation surrounded by the capsule. There were twenty-five specimens, or 41 per cent, in which epithelium was found to be proliferated. It was also noted that as soon as active proliferation starts, there is developed an early cystic condition.

Granulomata in which there was proliferating epithelium were differentiated from radicular cysts by the absence of a complete epithelial lining and the presence of active proliferation.

A Histopathological Study of Ameloblastoma

By Hamilton Robinson, D.D.S., M.S., School of Medicine and Dentistry, University of Rochester

The ameloblastoma is an embryonal epithelial tumor occurring chiefly about the jaws. It never forms enamel and is not a hard growth. Though anatomically benign, the branching epithelial strands and follicles may grow into the bone spaces and lead to difficulty in enucleation. Morphologically, the tumor resembles the developing enamel organ or its degenerated form. While no single ameloblastoma has been followed, histologically, through the various transitional stages, it seems probable that there is a solid to cystic degeneration. Studies on a series of cases indicate that the solid ameloblastoma closely resembles the developing enamel organ up to the point where the generative process of enamel formation should begin. From this stage the neoplasm shows degenerative changes, with cyst formation. This solid to multicystic transition has been noted by Kronfeld (J.A.D.A., 17:681, April 1930) and is confirmed by the author's studies of four additional cases. (To be published in *Archives of Pathology*.)

A Correlation of the Gross Periapical Roentgenologic, Bacteriologic and Histologic Dental Findings Obtained at Postmortem

By Lester W. Burket, A.B., D.D.S., M.D., Yale University School of Medicine

Human necropsy material was used for a bacteriologic study of 445 tooth apices by an external approach method. The bacteriologic findings were correlated with

the clinical condition of the teeth and the periapical radiolucent changes. Serial microscopic preparations were made to determine whether the opening made during the bacteriologic examination reached the periapical tissues. These preparations will also be used in correlating the histologic changes in the dental tissues with the other studies. Simultaneous blood and visceral cultures were also made for analysis with the periapical results. Dental tissues obtained from postmortem material permitted the use of aseptic bacteriologic technics rarely possible in the living subject, and, in addition, adequate numbers of normal teeth could be studied as controls.

The results obtained from postmortem bacteriologic studies of periapically roentgenologically positive teeth, by the external approach method, so closely approximated the averaged findings derived from clinical sources, by numerous observers over a long period of years, with different technics, that the postmortem and clinical findings were mutually confirmatory. Streptococci were recovered from 89 per cent of the teeth, with positive periapical cultures; 62 per cent were *Streptococcus viridans*. Growth was obtained from 30 per cent of the periapically roentgenologically negative teeth; 76 per cent of these with a small periapical radiolucent area and 60 per cent with a large periapical radiolucent area. The highest percentage of pure cultures was obtained from teeth with no periapical radiolucent changes, and the percentage of mixed cultures increased with the size of the periapical radiolucent area. No characteristic bacterial flora was observed for any clinical or roentgenological group. Additional studies will be required to determine the pathway by which organisms reach the periapical region of normal teeth. (Published in *Yale J. Biol. and Med.*, 9:271, 1936-1937.)

Experimental Production of Dental Foci at the Apices of Monkeys' Teeth and the Relation to Systemic Disease

By Harlod Genvert, D.D.S., M.D., Henry A. Miller, D.D.S., M.D., and Caspar G. Burn, M.D., Yale University School of Medicine

Study of the relation of dental infection to systemic disease was made by experimentally producing infection at the apices of teeth in monkeys and following the subsequent course of the animals.

Two methods were used in producing the dental infection: (1) Exposing the pulp chamber to the fluids of the mouth cavity and (2) sealing into the pulp chamber known strains of *Streptococcus viridans*. The duration of exposure of the teeth varied from 3 to 400 days. Preoperative and postoperative tests covered daily temperature, frequent blood counts, blood cultures, sedimentation rates and bacteriologic and immunologic observations. At the end of the experiment a complete postmortem examination and bacteriologic culture of the blood and viscera were made upon each monkey.

In 11 monkeys there were 54 teeth that had the pulp chamber exposed by means of either a small or a wide opening. Of these, 42 teeth showed histologic changes at one or more of the apices. Of 93 roots, there were 64 that developed lesions; 27 had no change, and in 2 the surrounding tissue was destroyed by the bacteriologic procedure. The histologic lesions consisted of abscesses in 37, exudate in 22 and granulomata in 5. Cysts, fistulae and antral and nasal polyps developed in some of the animals. The minimum time for the development of the periapical lesions was over 60 days.

Thirty-six roots were positive and 57 negative, roentgenologically. Of the 57 negative roots, 30 had lesions. The failure to demonstrate the lesions was due to

technical difficulties in obtaining roentgenographic pictures including all 3 roots of the posterior teeth in the monkey. Duration of exposure of the teeth contributed to some of the negative results.

Bacteriologically, 61 cultures were taken from the surrounding tissues of the apex; 30 were positive for growth. *Streptococcus viridans* was the predominating organism.

Clinical changes were found in the teeth and consisted of slight mobility, buccal or lingual swellings, fistulae and misplaced teeth. There were no observed systemic changes in any of the monkeys which could be attributed to the dental infection. Likewise, the postmortem examination yielded no significant findings.

A preliminary series of experiments of inserting known strains of *Streptococcus viridans* into the pulp-chamber cavity produced lesions at the apices of the teeth. Some of the control teeth also developed lesions. There were no demonstrable systemic changes in these monkeys.

Influence of Hypersensitivity in the Localization and Disseminaton of Streptococcus Viridans in the Incisor Teeth of Rabbits

By David Weisberger, D.D.S., M.D., Yale University School of Medicine

In studying the relationship of hypersensitivity to the localization of *Streptococcus viridans* at the apices of the teeth, it was observed that the bacteria remained in the blood stream of the rabbits sensitized to horse serum for a significantly longer period than in the nonsensitized rabbits, provided both the horse serum and bacteria were inoculated simultaneously into the venous system. Also, the visceral tissues of the sensitized rabbits tend to retain bacteria for a longer period than these tissues in normal rabbits. This phenomenon brought about a dissemination of bacteria from foci previously established at the apices of the incisor teeth when the horse serum was inoculated into the sensitized rabbits. This shocking dose of horse serum aids not only in establishing a bacteremia but also in freeing them from the inflammatory foci. When the hypersensitive response is established in the teeth of sensitized rabbits, localization of *Streptococcus viridans* from the blood stream readily occurs within this area. This depends upon the quantity of the initial inoculation of the bacteria and upon the extent of inflammatory reaction produced in the tissues.

An Application of the Micro-Incineration Method to the Study of Early Calcification Phenomena During Odontogenesis (Preliminary Report)

By H. R. Churchill, D.D.S., Dr. Med. Dent., Tandarts, School of Dentistry, University of Pennsylvania

A study is presented to obtain knowledge of chemical phenomena in the tissues of the jaws before actual tooth development begins. For this investigation, mice in different stages of postnatal development are selected and a technic applied whereby sections of these animals are incinerated to destroy their organic contents, at the same time retaining the inorganic material in its exact distribution.

Using this method made it possible to show the mobilization and concentration of minerals in a tissue area before actual tooth development takes place. Photomicrographic enlargements of the sections were shown, demonstrating the distribution of these minerals. Their chemical nature was tentatively determined, and the physical and chemical methods discussed to check on this determination.

Factors in Human Saliva Correlated with the Presence and Activity of Dental Caries

By Maxwell Karshan, Ph.D., College of Physicians and Surgeons and School of Dental and Oral Surgery, Columbia University

Determinations on paraffin-stimulated saliva were made for carbon-dioxide capacity, ammonia nitrogen, total calcium, inorganic phosphate and protein; and the fractions of calcium, phosphate, and protein removed when saliva is shaken with tricalcium phosphate. The most striking finding is that stimulated saliva of caries-free and caries-arrested groups differs from that of the active caries group in at least three respects:

The caries-free and caries-arrested groups have significantly higher values for carbon-dioxide capacity, higher values for percentage of calcium removed and lower values for percentage of phosphate removed when saliva is shaken with tricalcium phosphate. These data show that definite differences in stimulated saliva are correlated with the presence and activity of dental decay.

The mean values for total calcium and inorganic phosphate were greater in the caries-free than in the active-caries group, the differences being similar in magnitude and direction to those previously reported.

Similar differences in mean values were found between the arrested-caries and active-caries groups in these respects. These differences may also assume significance if still larger groups continue to give similar results. The values for protein and ammonia nitrogen show no significant differences. (Aided by a grant from the Carnegie Corporation. Published in *J. D. Res.*, 15:383, December 1936.)

The Effect of Hormonal Treatment on the Gums and Oral Mucosa of Women: (A) With the Use of Estrone;* (B) With the Use of the Gonadotropic Hormone of Pregnancy Urine†

By Daniel E. Ziskin, D.D.S., School of Dental and Oral Surgery, Columbia University

As a continuation of the studies of pregnancy gingivitis and the effects of Estrone and the gonadotropic hormone (Folluetin) by Blackberg and Ziskin, this paper concerns itself with a study of six patients from Dr. Raphael Kurzrok's clinic for gynecological diseases, three of whom were being injected with Estrone (Progynon B-Schering) for amenorrhea and three with Folluetin (Squibb) for prolonged menstrual bleeding.

The gross and microscopic condition of the alveolar and areolar gingivae were noted during the parenteral treatment and the changes occurring compared with those in rhesus monkeys under similar treatment. A case under Prolan treatment is cited, wherein a clinical case of Vincent's gingivitis was elicited. This reaction was relieved upon discontinuation of the hormone, this again indicating the similarity to the response of the rhesus monkey.

Conclusions—Progynon B injections cause hyperkeratinization of the oral epithelium and are conducive to a healthy gingival state.

The gums of women receiving Folluetin show evidence of inflammation and degeneration both grossly and microscopically.

In one case, hormonal therapy prob-

*Estrone—The material used is the monobenzoate of estradiol, commercially known as "Progynon B," manufactured by Schering Corporation.

†Extract of pregnancy urine—"Folluetin," gonadotropic in action, commercially prepared by Squibb.

ably predisposed the patient to Vincent's infection.

The effect of Folluetin on the gums and mucous membranes of castrate monkeys indicates its action as probably being directly on the tissues.

A Comparison of Diurnal and Nocturnal p_H Values of Saliva

By Louis I. Grossman, D.D.S., Dr. med. dent. (Rostock), and Bernard M. Brickman, D.D.S., Philadelphia, Pa.

Hourly p_H determinations of saliva, generally for twenty-four consecutive hours, were made on three groups of subjects: (1) Those in good health, who were active for twenty-four consecutive hours (no sleep day or night while tests were being made); (2) those in good health who followed an ordinary routine; (3) patients in the medical ward of a hospital.

Results: *A perceptible drop in p_H, indicating increased acidity, was noted during sleep.* The average p_H for the first group was 6.7; the average p_H for the second group while awake was 6.7 and during sleep was 6.4; the average p_H for the third group while awake was 6.3 and during sleep was 6.1. Additional results and conclusions will be detailed in another paper.

Squamous-Cell Carcinoma of the Tongue as a Sequel to Leukoplakia

By Malcolm Wallace Carr, D.D.S., F.A.C.D., Department of Oral Surgery, Metropolitan Hospital, Department of Hospitals of the City of New York

Scientific research has demonstrated that cancer in many instances is a preventable disease and also that early lesions of cancer, if treated properly during the initial stage of the disease, are curable. The tissues of the mouth are commonly affected by cancer. The lips, tongue, floor of the mouth and the mucous membrane of the cavity of the mouth may be affected. It is known that chronic irritation either causes or contributes to the cause of this disease. Various forms of chronic irritation may be responsible for the chronic local irritation of the tissues of the mouth, and, if such irritation is allowed to continue, it will eventually promote certain tissue reaction that may develop into cancer. Excessive use of tobacco in any of its forms, decayed teeth with sharp edges and poorly fitting dentures and bridgework are the most common factors in chronic local irritation. In many instances intra-oral cancer is preceded by leukoplakia, a precancerous lesion, which is not cancer, but tends to develop into cancer if neglected or if the chronic irritation that produced it is allowed to continue.

A case record of squamous cell carcinoma of the tongue is reported in detail. The patient was a man fifty-eight years of age with leukoplakia of the tongue, which according to history had remained unchanged for nine years. Within the two years that followed, extensive squamous-cell carcinoma (Grade II) had developed at the site of the preexisting precancerous lesion of leukoplakia, infiltrating deeply to the base of the tongue. The lesion was too extensive for radium therapy. Complete cautery glossectomy was performed with excellent initial result. (For detailed report of this case, see *Ann. Dent.*, 3:189, December 1936.)

Diagnostic Importance of Nasal Accessory Sinus Disease in Dental Practice

By Leon H. Collins, Jr., A.B., M.D., Schools of Medicine and Dentistry, University of Pennsylvania

During the past three years my associates and I have been responsible for the setting up of a course in medicine for dental students. Our teaching duties and consultations with members of the dental faculty concerning either medical or dental patients have served to impress

upon our minds the vastness of the territory, still inadequately explored, which properly proves to be the province of both the dentist and the physician. Almost daily, as this work has continued, new clinical problems appear where internal medicine may be of service to the dentist faced with a rather perplexing diagnostic or therapeutic problem.

A case of severe oral infection of several months' duration, in a man, seventy-one years of age, was described. Local therapy for the treatment of mouth lesions had been without apparent benefit. Wide-spread sinus disease was disclosed by clinical and roentgen examination. Local treatment of the sinuses, in addition to general measures and the administration of an autogenous vaccine, has been followed by slow but steady improvement, both locally and generally.

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Diagnostic Significance of the Tongue in Internal Medicine

By BERNARD I. COMROE, M.D., Schools of Medicine and Dentistry, University of Pennsylvania

MEDICINE has become so highly laboratized that simple examinations, such as inspection of the tongue and palpation of the pulse, are frequently neglected. Although many physicians and dentists look at the tongue, they often do not see that at which they are looking.

The tongue has long been considered by layman and physician as the mirror of the stomach. A few of the conditions which might be strongly suspected from lingual study include syphilis, scarlet fever, pernicious anemia, sprue, Addison's disease, secondary anemia, cardiac failure, polycythemia, diabetes mellitus, allergy, leukemia, agranulocytic angina, obstructive jaundice, hyperthyroidism and chorea.

Canker sores of the tongue have at times been shown to be of an allergic nature, *i.e.*, due to sensitivity to certain foods or proteins. Such small ulcerations may also be caused by an electrogalvanic burn from galvanic currents set up in the mouths of individuals who have dissimilar metals in fillings, crowns or bridgework.

Atrophy of the papillae of the anterior two-thirds of the tongue (the bald tongue) has been seen in various diseases: pernicious anemia, sprue, Plummer-Vinson syndrome, the severe anemias of pregnancy, achlorhydric anemia, pellagra, malnutrition attended by dysentery and anemia, intestinal stricture, pyloroplasty complicated by peritonitis, *Dibothriocephalus latus* infestation and, sometimes, simple achlorhydria. Middleton believes that this disorder is usually secondary to vitamin-B deficiency; feeding of vitamin B in experimental animals will cause reappearance of the papillae.

Characteristic lesions may also be found on the tongue in some cases of peptic ulcer, various blood dyscrasias and neurological conditions.

A METHOD OF BRINGING IMPACTED TEETH INTO NORMAL POSITION

By J. J. MOFFITT, D.D.S., Harrisburg, Pa.

THE occasional orthodontic case that cannot be treated by the general rules of orthodontia calls for a variation in the routine of the usual ones. Among these cases, impacted teeth that must be brought into the arch increase the interest and sometimes tax the ingenuity of the operator. Several cases illustrating a practical method of restoring these teeth to the arch are here shown.

REPORT OF CASES

CASE 1.—A girl, aged 10 (Fig. 1), had a lower right lateral incisor that erupted almost as far back as the first deciduous molar. The deeply impacted permanent cuspid was not evident at first and the condition was supposed to be due to too early extraction of the deciduous cuspid and lateral incisor. This permanent cuspid became evident several years later when there was a swelling below the roots of the right central and lateral incisors. The misplaced lateral incisor had been moved nearly to place when, its farther progress being interfered with, the presence of this impacted cuspid was discovered. The protrusion was so far down that it soon caused a considerable disfigurement of the chin. To bring this cuspid into position, it was necessary to cement into the tooth a fine wire eyelet to connect it to the regulating arch.

These eyelets can be made with heavy regulating wire or any 23-gage wire and 14-carat gold solder, the main object being to make them as small as possible so that they will be invisible when no longer needed. From the eyelet, a piece of regulating wire extends around the arch for traction. To promote dryness of the impacted tooth, a pattern for a gold casting over the adjoining teeth is made on the model with 30-gage casting wax extended down over the gums so that it will cover the opening to be made to the impacted tooth. This casting is fitted to the teeth so that it will be ready to and can easily be cemented in place. The incision is then made with a lancet and the bone over the impacted tooth is removed with a No. 9 or 11 round bur. In these cases, nitrous oxide-oxygen, administered with a nasal inhaler, was used as the anesthetic. As soon as the bleeding has been checked sufficiently, the opening is dried out with a blast of air, and a piece of sterile paraffin of suitable size is inserted in it. The gold casting, having been prepared with cement or chloropercha in the cusp impressions of the adjoining teeth, is pressed into place with a hot instrument, which forces the paraffin down into the incision. The first time the casting is put in place, in extensive areas, it may be fastened with chloropercha so that, in a few days, it can be removed for renewal of the paraffin after the bleeding has stopped. This is not necessary in small areas that can be cemented at once. In making the incision to the impacted tooth, if the tooth lies outside the bone, a path should be cut for it with a No. 11 round bur so that it will move easily into position. This is not difficult as the young bones are quite soft and judgment as to the direction of the path is the only require-

ment that is exacting. In about three weeks, a membrane will form beneath the paraffin, insuring dryness. The hole in the tooth for inserting the eyelet is made with a new No. 1 round bur. The eyelet in these cases was made of heavy regulating wire, of 23-gage, and a very slight protuberance is made at the end of the eyelet with a bit of 14-carat solder to assure a firmer attachment when the wire is cemented in the tooth. The soldered and enlarged eyelet should not be made larger than 20-gage so that it will fit the hole made by the No. 1 bur. This opera-

Fig. 1 (Case 1).—Lower lateral incisor erupting near first deciduous molar. Irregularity caused by the presence of the deeply impacted cuspid (lower right).

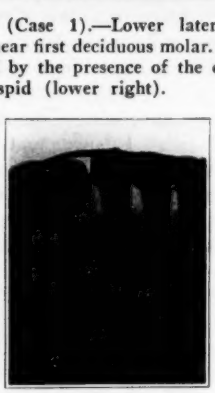

Fig. 2 (Case 1).—Case after completion, showing result obtained by use of paraffin held in by gold plate, to secure dryness for cementing eyelet into cuspid.

Fig. 3 (Case 2).—Impacted, bone-encysted bicuspids (lower right).

Fig. 4 (Case 2).—Bone obstruction removed and eyelet cemented into first bicuspid. The wire spring attached to the arch furnishes traction.

Fig. 5 (Case 3).—Appearance of case after removal of fused upper right central and lateral incisors. There are two left central incisors and a right lateral incisor.

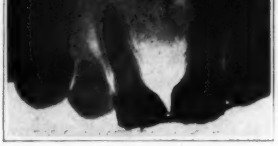

Fig. 6 (Case 3).—Case on way to completion. A deciduous cuspid, shaped to resemble a lateral incisor, replaces the permanent cuspid. The supernumerary left central incisor was shaped to resemble a right central incisor. The final result is quite satisfactory.

tion of cementing in the eyelet must be done under absolutely sterile conditions so that the tubules of the impacted tooth will not be infected. The first one of these eyelet insertions was made over twenty years ago and still has the original filling in it. Figure 2 shows the completed operation. In this case and the one following, the patients suffered no pain nor discomfort and their daily routine was in no way interefered with. It is sometimes necessary to solder an additional extension to the regulating arch for attachment of the traction wire if putting it directly around the arch does not provide traction in the most advantageous direction.

CASE 2.—A girl, aged 12, had two impacted and encapsulated bicuspids in the lower right mandible. (Fig. 3.) The entire gum was removed over the two teeth with a lancet and the bone removed with a No. 9 round bur. It is better to use round burs for removing this bone than to use fissure burs or chisel out the encapsulated teeth as there is less likelihood of scratching the enamel. It is less of a shock than chiseling, and the difference between the enamel and the softer bone can be more readily felt with the round edges of the bur. In this case, only one eyelet was necessary, as after the bone had been removed and the first tooth brought up into place, the second one followed of its own accord. (Fig. 4.)

Both of these cases would have meant disfigurement to the patients if allowed to go uncorrected.

CASE 3.—A boy, aged 10, had impacted upper right central and lateral incisors, which were also fused together, and there was a supernumerary central incisor on the left side. Before he came in for treatment, the fused teeth had been removed, a deep indentation remaining on the right side and the two central incisors remaining on the left side of the median line. The deciduous right cuspid was still in place and the permanent cuspid had begun to erupt in front of the deciduous one into the opening that was left by the removal of the fused tooth mass. Whether it would have been possible to save one of these extracted roots for the attachment of a porcelain crown could not be determined as they had been disposed of. The treatment in this case was to utilize both central incisors, moving the median line as far as possible to the right, allowing the right permanent cuspid to take the place of the lateral incisor that had been extracted and keeping the deciduous cuspid in place as long as possible, as there were no signs of absorption of its root. Figure 5 shows the case with the two central incisors on the left side of the median line and the permanent cuspid inclined into the incision from which the fused mass had been removed. Figure 6 shows the result of moving the central incisors as far as possible into the incision and reshaping the supernumerary central incisor to resemble the right central incisor and the cuspid to resemble the lateral incisor.

This is merely an illustration of dental engineering to avoid the necessity of making a bridge in this early stage of the patient's life. These deciduous cuspids when not subject to pressure from an erupting permanent tooth will often remain many years in place.

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RECONSTRUCTIVE PLASTIC AND ORAL SURGERY

By ARTHUR E. SMITH, M.D., D.D.S., and JAMES B. JOHNSON, M.D.,
Los Angeles, Calif.

ALTHOUGH plastic surgery was one of the earliest forms of surgery practised, its recognition by the ethical medical profession was delayed for centuries owing to the influence of quacks and charlatans, who played a major rôle in the beginning of this specialty. For years, these men were classed as "beauty culturists" or "beauticians" and the type of work done by them was below the standards of the medical profession. This was responsible for the stigma which was attached to plastic procedures and which has necessitated a gradual reeducation of lay people as regards the value and scope of present-day plastic surgery and even today has not been completely annihilated.

From time immemorial, rhinoplasty has been performed for the relief of disfigurement caused by mutilation of the nose. Certain religious rites and military punishments in the olden days were responsible for complete excision of the nose, which was usually done by the stroke of a sword. During this time, plastic surgery was widely exploited through lay channels, but little attention was accorded it by the ethical medical profession. Other plastic operations for various disfigurements were performed as early as the fifteenth century, but what is known of the results that were obtained by those methods is anything but gratifying. Such was the status of plastic surgery for two or three hundred years. During this time, little progress was made because of the lack of interest of the medical profession and the poor training of the men who practiced this art. Consequently, those in this field were looked on with disdain.

Apparently the earliest reports of plastic surgery recorded in literature are those of Benedictus, in 1492. About 100 years later, Tagliocozzi wrote a textbook on plastic procedures. This book apparently remained unnoticed until the eighteenth century, at which time the procedures were adopted by many surgeons, because they had come to realize the value of this highly specialized branch of surgery. Since that time, contributions to this field have been made by some of our greatest surgeons, including Revirdin, Wolfe, Thirsch, Brophy, Davis, Brown, Blair, Smith (Ferris), Ivy, Gillies, Dorrance and many others.

The new era in reconstructive surgery can be attributed in large measure to conditions arising out of the World War. The necessity of segregating the cases of mutilation of the face as well as various other types of surgical conditions during the War, naturally resulted in an aroused interest among the military surgeons. It gave them an opportunity to learn a more scientific and improved surgical procedure in these cases. Although many surgeons of today assert that plastic surgery had its awakening previous to that

(Read before the Section on Oral Surgery, Exodontia and Anesthesia at the Seventy-Eighth Annual Session of the American Dental Association, San Francisco, Calif., July 15, 1936.)

time, none can doubt the profound influence of that great catastrophe on this ancient but lethargic branch of surgery.

Today, more than at any other time in the world's history, it is necessary for every person to be as nearly perfect physically and mentally as possible in order to be a success. It seems that appearance is more important today than ability, when there is a choice between applicants for positions. Mental perfection is less possible when any deformity is present. It is well known that congenital or acquired defects produce profound mental changes, and, in consequence, affect the general physical condition.

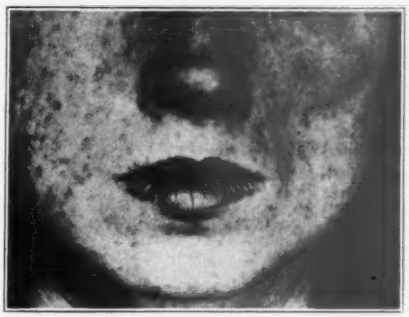

Fig. 1 (Case 1).—Asymmetry of face. Distortion of the features on the left side is due to crushing of the maxilla and malar bone from the impact of a baseball. The cheek is sunken three-fourths inch, depression of the ala, ectropion of the lower eyelid and drawing of the tissues at the left angle of the mouth resulting.

There seems to be no relation whatsoever between the degree of deformity and the extent of the mental changes produced thereby. From a minor deformity, certain patients develop such marked inferiority complexes that they are practically driven into seclusion. Not only do these patients present a pitiful spectacle, but, in the severe types, they very often also present a problem for society which is not easily solved. In many of these patients, profound mental depression is found to result from such conditions as overdevelopment of the nose, scarring or paralysis of facial tissues and distorted outlines. These can be eliminated by methods known to the skilled plastic surgeon of today.

The automobile plays a major rôle in the conditions which are encountered by the plastic and oral surgeon of today. The motor accident, together with the competitive sports, is responsible for a large percentage of traumatic conditions. Congenital lesions, such as cleft-palate

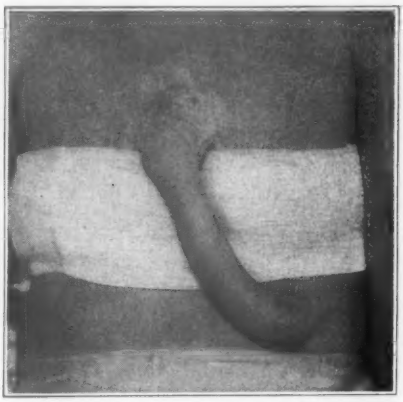

Fig. 2 (Case 1).—Tubed graft prepared from skin and fat on left abdominal wall en route to left side of face. The graft is 9 inches long and 1¾ inches in diameter.

and cleft-lip, various new growths and various other deformities, account for an equally large percentage of the cases brought to the plastic surgeon. The progress which has been made in the repair of cleft-palate can be attributed to the once hated plastic surgeon. For years, the general surgeon was satisfied with closing the cleft and paid little attention to the deformed nose or to the functional result thus obtained. Many of these cases re-

sulted in closure of the cleft in the midline, in many instances incomplete, and a very high percentage of which gave no improvement in speech whatsoever. The history of the progress of cleft-palate surgery is a volume in itself. Great credit must be given to Dorrance for his "push-back" operation, which is especially applicable when there is a deficiency in the length of the palate.

The important rôle of the dentist in this field of surgery cannot be forgotten. His hearty cooperation, especially in facial restoration by replacing the maxillary and mandibular arches in their normal position and relationship, and also the numerous appliances which he is directly responsible for have been of inestimable value to the oral surgeon. We often utilize dental training in these cases.

Following is a report of five cases that have recently come under our observation and care.

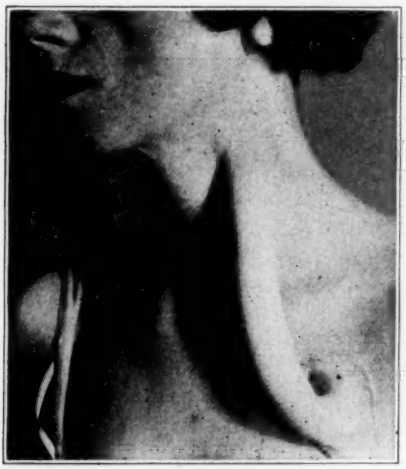

Fig. 3 (Case 1).—Last stage of transferal of tubed graft before lower end is opened, deepithelized, shaped and prepared to enter cheek, as shown in Figure 4.

Fig. 4 (Case 1).—Tubed graft in place. It was inserted through a 1¼ inch incision below the mandible. The skin over the entire left side of the face was loosened. The edges of the graft are immobilized by equidistant sutures tied over buttons.

REPORT OF CASES

CASE 1.—D. G., a woman, aged 23, a stenographer, consulted us concerning a deep depression in the left cheek, of seven years' duration. The history of this case revealed that, at the age of 10, the left side of the face was struck by a baseball. Aside from removal of the tonsils and adenoids, at the age of 5, the surgical history was negative. The patient was normal and healthy and had had no serious illness.

Physical examination revealed that she was well developed and well nourished. She was suffering from no physical pain and there was no evidence of infection. The general physical examination was negative.

According to her mother, the patient had suffered for several years from an "inferiority complex," so much so that she refused to accept any invitations.

Examination revealed a deep depression in the region of the left cheek extending over an area about 2½ inches in diameter,

the point of the greatest depression being below and medial to the left maxillary sinus. The greatest depth of the depression was three-fourths inch. Palpation elicited no pain or tenderness.

Intra-oral examination revealed an absence of the upper left first and second bicuspids and the first molar. The tissue in this area was normal in appearance.

The impact of the baseball fractured the anterior wall of the antrum, the malar bone and the infra-orbital margin of the maxillary bone. The roentgen-ray examination revealed almost complete obliteration of the maxillary sinus. The infraorbital margin appeared to have been fractured. There was an ectropion of the lower left eyelid and the left ala was widened and distorted, with the left angle of the mouth drooping and pulling to the left side. The natural contour of the left side of the face was destroyed, there being a concave surface instead of the normal convex outline. Measurements revealed that the concavity of the left side of the face was three-fourths inch beneath the normal contour line, as compared with the right. The thickness of the tissues at the deepest portion of the concavity was one-eighth inch and the palpating fingers received the impression that only skin and mucous membrane were present.

Fig. 5 (Case 1).—Appearance of patient after completion of plastic operation. There is symmetry and even balancing of the right and left cheeks and a pleasing smile as compared with the distortion of the features and sad expression, due to an inferiority complex, as shown in Figure 1.

Reconstructive Surgery.—A tubed graft containing considerable adipose tissue was prepared on the abdominal wall on the left side of the abdomen and was transferred in four steps to the face. This tubed graft was stepped up to the neck and was used to restore the facial contour of the left side of the face. An incision $1\frac{1}{4}$ inches in length was made parallel to the lower border of the left side of the mandible. The skin was carefully loosened from the underlying tissues at the angle of the mouth, beneath the ala, and beneath the lower left eyelid and extending $1\frac{1}{2}$ inches anterior to the left ear. The lower end of the tube was opened and the surface of the skin was de-epithelized. After prepara-

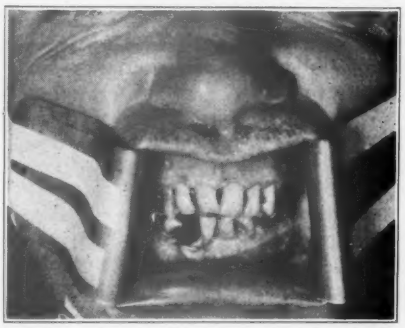

Fig. 6 (Case 2).—Immobilization of the jaws by intermaxillary wiring, after insertion of a bone graft taken from the ilium. Normal relationship of the jaws has been restored.

tion of the end, the tubed graft was pulled through the small incision and held by equidistant sutures, which were placed on the margin of the flap. The flap was carefully cut to definite measurements as to thickness and width, which were predetermined by means of models. The stitches were inserted in the graft before it was placed in position and then extended through the skin at equidistant points and tied on the outside over pearl buttons. Three weeks later, the lower end of the tube was detached from the active graft, the lower portion of the graft shaped and molded to the proper contour and the skin incision closed. All operations were performed under local anesthesia. The facial contour of the left check was restored to normalcy, the cheek being now of the same degree of fulness as the uninjured right side of the face. The sides of the face were symmetrical and evenly balanced. The left ala was elevated. The left lower eyelid was relieved of ectropion. The left side of the upper lip and the angle of the mouth were restored to normalcy. There was a complete restoration of expression.

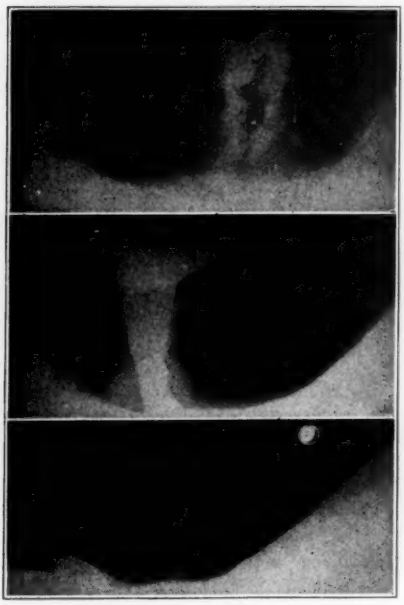

Fig. 7 (Case 2).—Above: Pathologic destruction of ends of bone fragments and sequestra. Center: Separation of bony fragments six weeks after operation. The jaws were held by intermaxillary wiring until the bone graft was completed. Below: Bone graft which was made eight months after the first operation, shown in the roentgenogram at the top. It will be noted that the bone graft and surrounding bone are undergoing regeneration.

Fig. 8 (Case 2).—Union of bone graft and regeneration of bony fragments, eight months after the bone graft operation.

The surgical result was very gratifying in that the patient now has a face that is normal and symmetrical in appearance and a normal mental attitude. (Figs. 1 to 5.)

CASE 2.—H. W., a man, aged 40, a musician, had, in an automobile accident, received a severe blow on the tip of the chin resulting in fracture of the lower jaw in the median line. According to the history, he suffered from a secondary infection and

considerable loss of bone in the region of the fracture. He remained in the hospital for several months, undergoing treatment. After the loss of bone in the median line, the fragments were approximated by wiring by his physician, which resulted in a narrowing of the lower arch. The loss of bone in the region of the symphysis resulted in a marked pointing of the chin, the normal contour of which was rounded. There was hardly room enough for the patient's tongue inside the mouth and only two teeth were in contact. The bony fragments were in apposition, with fibrous union. The case was referred to us by J. C. Vinetz, of Los Angeles, about six months after the original injury.

Examination revealed that a very pointed lower jaw was crowding the tongue. An external fistula beneath the chin was discharging mucopurulent material. Roentgenograms revealed several sequestra in the line of fracture. Through an incision in the region of the fistula, the sequestra were removed, and the bone edges were thoroughly curetted. The right and left lower jaw fragments were moved laterally, the teeth were placed in proper occlusion and the lower jaw fragments were immobilized to the upper jaw by intermaxillary wiring.

Eight months later, a bone graft was made. This graft was removed from the ilium with Albee's saw and measured three-fourths by one-half inch. For seven weeks following the insertion of the bone graft, the lower jaw was held rigid by means of intermaxillary wiring. The bone graft was a complete success and the contour of the lower jaw was restored to normalcy. (Figs. 6, 7 and 8.)

Fig. 9 (Case 3).—Right profile prior to corrective rhinoplastic operation. The nose has a hump and is too long, while the lower half is too low.

Fig. 10 (Case 3).—End-result of rhinoplastic operation. (Compare Fig. 9.)

Case 3.—J. L., a boy, aged 18, a college student, consulted us concerning a corrective rhinoplasty. The history revealed that he had suffered mutilation of the nasal tissues, bones and septum, ten years previously, when his nose was bitten by a Shetland pony. For a period of about five years thereafter, he suffered difficulty in breathing and intermittent epistaxis. After repeated cauterizations failed to prevent recurrence of epistaxis and afforded no relief from difficult breathing, a submucous re-

section of the septum was performed by the family surgeon. After this operation, the difficulty in breathing was lessened, but only very slightly. Patient also complained of an occasional whistling sound accompanying breathing through the nose and an increase in the cosmetic nasal deformity consisting chiefly of a flaccidity of the lower nasal tissues allowing the tip to fall and the slightly everted nostrils to widen.

Examination revealed a very prominent "hump" at the bridge of the nose which consisted of an elevation three-sixteenths inch above the normal outline of the nose and extended for a distance of about one inch as viewed in profile. The lower half of the nose was practically devoid of any support, being freely movable from side to side. The nostrils were very wide and flaring and the nasal tip was widened and depressed about one-half inch below its normal level. The nose was one-fourth inch too wide at the bridge.

Intranasal examination revealed bilateral hypertrophy of the inferior turbinate bones. The septum was deviated to the left about one-fourth inch and at its lower one-third a patency was present which was one-fourth inch in diameter.

Operation was performed in several stages and, with the exception of one procedure, under local anesthesia. Correction of the deviation of the septum was first accomplished by incision of the cartilage in several directions and slight overcorrection by the use of intranasal packs. Hypertrophied tissues of the inferior turbinate bones were next removed by the actual cautery.

Removal of the hump was accomplished by means of the nasal saw and, at the same time, the saw was used to divide the nasal processes of the maxillary bones and the nasal bones at their bases in order to bring them medially to decrease the width of the nose in this region. The next procedure was a cartilage transplant from the eighth costal cartilage to provide the necessary framework for the lower portion of the nose. The cartilage was carved to proper specifications and two pieces were utilized, one placed horizontally and the other vertically. This furnished the necessary stability for the nose, elevating the tip to the

Fig. 11 (Case 3).—Appearance of patient before operation; showing crooked nose and wide nasal base.

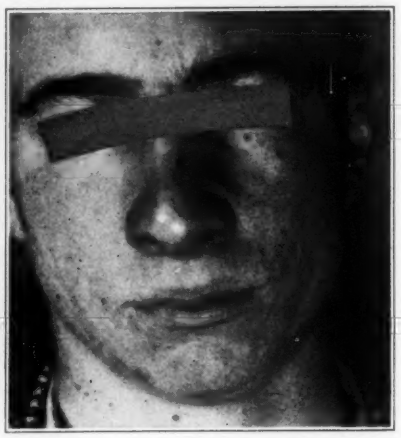

Fig. 12 (Case 3).—Appearance of patient after completion of operation. The nasal base has been narrowed and the septum straightened. (Compare Fig. 11.)

desired height and decreasing the flaring of the alae.

The septum was closed with nasal mucous membrane by means of relaxation incisions, which were made at different levels on either side of the septum. Both sides healed by first intention.

This operation was performed for both functional and cosmetic reasons, as is the case in many cases of corrective rhinoplasty, and, in all cases of this type, function is given primary consideration and appearance secondary. (Figs. 9 to 12.)

CASE 4.—L. F., a girl, aged 20, a student, consulted us concerning repair of a cleft-palate and cleft-lip. She stated that thirteen operations had previously been performed on her between the ages of 2 weeks and 11 years in a futile attempt to correct these deformities, but no improvement was noted in the condition. A large amount of tissue, including bone, cartilage and mucous membrane, was lost as a result of surgical procedures, a horrible functional and cosmetic deformity resulting. Her speech was so bad that it was difficult to understand any of her words.

Fig. 13 (Case 4).—Right profile, showing abnormal relationship of facial, jaw, lip and nasal tissues.

Examination revealed a poor repair of the lip because of a very wide scar and a discrepancy between the edges of the vermilion border of about one-eighth inch. The ends of the orbicularis oris were not approximated and therefore functioned separately rather than together. Inspection of the face revealed a marked deformity due to extensive loss and deformity of the underlying supportive tissues, resulting in the depression of the entire right cheek, including the right nasal ala, and a flattening of the upper lip. The base of the right ala was depressed and the naris closed. Owing to collapse of the cartilage of the ala, the lateral nasal wall contacted the septum in the lower third.

Examination of the mouth revealed a bad deformity of the upper jaw. There was a loss of a large amount of alveolar process of the right maxilla with only fibrous tissue separating the floor of the antrum from the mouth. Only four teeth were present in the upper arch, and these were badly deformed and irregularly positioned. The lower jaw protruded three-fourths inch, with a "scissors bite," with only one contact of tooth structure between the upper and the lower jaws. The deformity was so bad that the patient could easily cover the lower third of the nose with the lower lip and strike the end of

Fig. 14 (Case 4).—Front view showing patient placing lower lip over end of nose. It was easy to do this because of a "scissors bite," retrusion of the upper jaw, protrusion of the lower jaw and loss of teeth and alveolar process.

the nose with the lower incisors. The hard palate contained a cleft that was one inch wide in its greatest diameter. A small portion of the velum was closed, but was very hard and stiff from scar tissue and was deficient in length about three-fourths inch. Anteriorly, in the region of the mucous fold, an opening one-half inch in diameter connected the oral and nasal cavities. The entire tissue framework, which normally supports the lower end of the nose, was absent. The major portion of the much-operated-on palatal tissues consisted of thick, tough scar tissue having a deficient blood supply.

Operation.—The method selected for the closure of the hard-palate cleft, also the large opening connecting the oral and nasal cavities, was the tubed graft, which was selected because of (1) the abundant scar tissue and inadequate blood supply and (2) the extensive deformity due to the loss of alveolar process and mucous fold and the sunken condition of the upper lip. It was our desire to avoid, as nearly as possible, further tissue loss by sloughing due to the inadequacy of the blood supply. If closing of the clefts had been attempted by using the bipedicled sliding flap method, not only would loss of tissue have been imminent owing to inadequacy of the blood supply, but also exposure of the antrum, due to incorporating the antral floor scarred tissue in the bipedicled flap on the right side, would have been avoided. Even if the cleft in the hard palate and the cleft beneath the lip could have been closed by approximation, there would have been greater tissue contraction, distortion and deformity. The object of our surgical procedure was twofold: (1) closure of the clefts in order to restore function, and (2) providing tissue by reconstruction, to compensate for the large amount of tissue that had been lost, in order to restore a normal cosmetic appearance of the cheeks, lip and nose.

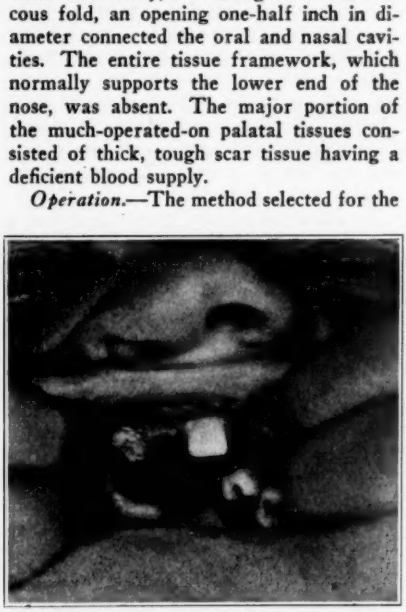

Fig. 15 (Case 4).—Large cleft present. The presence of excessive scar tissue and an inadequate blood supply prevented closure of the palate by utilizing palatal tissue flaps. The alveolar process is absent on the right side.

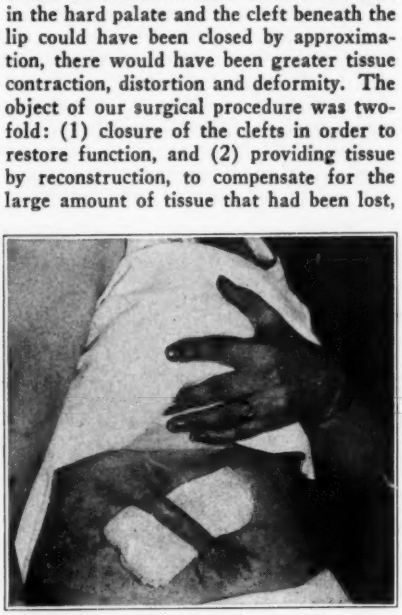

Fig. 16 (Case 4).—Original site of prepared tubed graft. Several operations were necessary to transfer the graft to the mouth, as shown in Figure 17.

The first procedure was to prepare a tubed graft on the right lower abdomen. The graft, before it was tubed, was 8 by $2\frac{1}{2}$ inches. It was transferred to the face in four operations. While the tubed graft was being brought to position, the nose was narrowed by dividing the nasal processes of the maxillary bones with fine saws. The nose was now molded to position and immobilized by a specially sculptured, form-fitting, cast-metal splint.

When the tubed graft from the abdomen reached the face, the sunken right ala was detached from its base and then elevated. The end of the tubed graft was de-epithelized and inserted beneath the ala through an incision in the mucous fold and sutured to position by several through-and-through sutures utilizing buttons. Three weeks later, the lower end of the tubed graft was detached and the lip was divided through the old scar by a through-and-through incision. The sides of the graft were de-epithelized and then reattached to the prepared edges of the cleft in the hard palate. The incised edges of the lip were split and the ends of the orbicularis oris muscle exposed and prepared for approximation. The vermilion border was carefully marked and

Fig. 17 (Case 4).—Tubed graft attached to upper lip and lower end ready to enter mouth to fill cleft as shown in Figure 18.

approximated, as was the orbicularis oris and the mucous membrane. The skin incisions were then closed. At a later date, the tube was divided at its center, the posterior half closing the hard palate cleft. The anterior half was de-epithelized and fitted into a prepared area beneath the upper lip, which permitted lip relaxation and established an adequate mucous fold for the reception of the labial rim of a specially constructed denture. Both of these grafts healed by first intention.

The operation to be done at a later date is the straightening of the nasal septum and reduction of the hypertrophied tissue covering the inferior turbinate bones. A cartilage graft from the eighth rib will be used to elevate the lower third of the nose. A special dental appliance will be constructed. The soft palate will be lengthened by utilizing a section from the posterior pharyngeal wall. The push-back method could not be employed in this case, because of the abundance of scar tissue, the absence of bone to form the floor of the antrum and excessive deformity. The push-back method would have been contra-indicated even if incisions had been extended from the palatal incisions over the alveolar ridge on each side into the mucous fold to pre-

Fig. 18 (Case 4).—Results of operation to close cleft. The tubed graft in Figures 16-17 are shown in position. The edges of the graft and cleft have united. This case is shown only to demonstrate closure of a cleft by use of the tubed graft. Numerous operations are being performed to reconstruct the profile, including the nose, lips, and upper and lower jaws. A report of results of completed operation will be published later.

pare y-shaped flaps. The y-shaped extension flaps, for median line approximation, could not have been made on account of the large cleft labial to the alveolar ridge, which also exposed the floor of the right antrum. This is the fourth case in which we have utilized the tubed graft for

the closure of difficult clefts and, in all instances, the surgical results have been highly satisfactory. The tubed graft in this case has again proved of inestimable value and has been used with marked success in cleft-palate surgery. (Figs. 13-18.)

CASE 5.—M. R., a woman, aged 27, a dancing instructress, was referred for the purpose of determining whether reconstructive surgery could be of value to her. Malformation of the face in this case was congenital.

Fig. 19 (Case 5).—Right profile view prior to reconstruction. The nose has an excessive hump and is too long. The upper lip is too short from columella to vermilion border. The upper anterior teeth and alveolar process protrude one-half inch beyond the normal, wide separation of the lips resulting. The lower jaw is underdeveloped and recedes three-fourths inch.

Examination revealed an overdeveloped nose, extremely long and possessing a prominent nasal hump. The upper lip was out of proportion as it was too narrow. The upper jaw was in protrusion, the upper six anterior teeth being in extreme protrusion. The chin was in extreme retrusion. The mandible was the size of that of a child of 8 years. The tip of the chin was three-fourths inch short of the position necessary for normal profile.

Fig. 20 (Case 5).—Results of surgical reconstruction. The pleasing expression is the result of harmonious blending of the facial characteristics, accomplished by tissue remolding, reduction and reconstruction.

Intra-oral examination revealed that there was a very high palate and a narrow upper arch, with the anterior teeth pro-

truding and pointing instead of assuming the normal arch contour. Occlusion was abnormal.

Profile examination revealed that the very long nose had a hump; the upper lip was narrow; the chin receding, and upper teeth protruding, with the lips far apart. The lips could be closed only by conscious effort. This facial profile was anything but pleasing because all parts which formed the profile were either overdeveloped or underdeveloped. The patient was keenly conscious of the abnormality and deformity of face, nose and jaws. She greatly resented having people observe her and always felt that they were noticing her deformity. As she considered her deformity a hindrance to her profession, she was willing to cooperate to the fullest extent in all surgical procedures to improve her appearance.

Reconstructive Operation.—Several operations were performed. The first step was to secure models of the upper and lower arches. To determine the amount of tissue reduction from the protruded upper jaw, the six upper anterior teeth and a sufficient amount of alveolar process were removed from the upper model to improve the contour and occlusion of the upper arch. This procedure was accomplished after the upper and lower models had been mounted on an articulator. The first operation, which was done under block anesthesia, consisted of the removal of the six upper anterior teeth and one-half inch of the alveolar process. The patient's dentist, Dr. Tylicki, of Long Beach, constructed a bridge with the porcelain facings accurately ground to fit the labial gum tissue. Removal of the teeth and one-half inch of the anterior part of the alveolar ridge allowed the upper lip to assume a normal position.

The next step was corrective rhinoplasty, consisting of shortening the nose one-eighth inch, which, in turn, widened the upper lip between the vermilion border and the columella to an extent of one-eighth inch. The nasal hump was removed and the nasal tissues molded to proper anatomic form.

The next operation, which was for reconstruction of the chin, consisted of removal of a large section of cartilage from the eighth rib. An incision one inch in length was made beneath the tip of the chin and the skin was loosened over the entire chin. A large section of cartilage was trimmed and incised in several places and was inserted through the small incision, allowing it to assume a horizontal position and resting directly over the symphysis and incisive fossae. The next operation was to remove three large sections of adipose tissue from the right abdominal wall. An incision was made beneath the tip of the chin as was done previously for the insertion of the cartilage. The skin was again loosened over the entire chin, from the mental foramen on the right side to the mental foramen on the left side. The three sections of adipose tissue were now inserted through the small incision and were spread out beneath the skin on both sides of the mandible and over the chin and held in position by equidistant sutures and by application of a cast splint, which was made from the sculptured face mask prior to operation. The cartilage and the adipose tissue completely restored the underdeveloped chin to normal profile.

The change in appearance of this patient, as you will see from the accompanying photographs, is as follows: The nose has been restored to normal length, shape and size. The nasal hump is missing. The upper lip has been widened, the upper lip let down one-half inch. The patient now closes the lips normally. The chin has been built out three-fourths inch. Profile and general appearance are now normal. (Figs. 19-20.)

The results obtained in this case have been striking and the patient has had particular delight in the fact that some of her friends did not recognize her after the reconstructive work had been completed. She is extremely happy and the inferiority complex has been completely eliminated.

Wilshire Medical Building.

AN EARLY AMERICAN POEM ON DENTISTRY

By FREDERICK C. WAITE, Ph.D., Cleveland, Ohio

IN the writings of the Greek poets before the Christian Era are found lines bearing on the teeth. They usually refer to the relation of teeth to personal appearance or to foul breath due to decayed teeth.

DENTISTRY IN LATIN POETRY

In the writings of the Latin poets, references to teeth and dentistry are more frequent. Mention is made of the influence on personal appearance of malalinement, decay and loss of the teeth. Also, reference is made to teeth of ivory and of gold and to teeth that have been purchased. There is frequent mention of dentifrices, including the common ancient use of human urine as a dentifrice.

The poet Marcus Valerius Martialis was born in Spain about 40 A.D., but later lived in Rome, where he died about 104 A.D. He is best known for his epigrams. One of these is of especial interest in the history of dentistry. It is epigram xxxvii of book ix and is addressed to Galla, who, as shown by the context of the entire epigram, was a superannuated courtesan. The first six of the ten lines read as follows:

Cum sis ipsa domi mediaque ornere Subura,
Fiant absentes et tibi, Galla, comae,
Nec dentes aliter quam Serica nocte reponas,
Et iaceas centum condita pyxidibus,
Nec tecum facies tua dormiat, innuis illo
Quod tibi prolatum est mane supercilio,

A free translation is as follows:

"Galla, they dress you down in the Subura (shopping district), while you're right at home; your hair too is made abroad; you put your teeth away at night just like your silks; your beauty lies stored in a hundred boxes; and your face never sleeps with you. But nevertheless you keep winking that eyebrow they put on you in the morning."

This quotation from Martial shows definitely that removable dentures, either complete or partial, were in use in Rome at the end of the first century of the Christian Era.

Baptista Mantuanus, the son of Pietro Spagnolo, a Spanish nobleman, was born in Mantua, Italy, in 1448 and died there in 1516. He rarely used his family name. Entering the Carmelite order of monks about 1466, he attended the universities of Bologna and Padua and became highly educated. He stood high in church favor, and during the last three years of his life, he was the supreme officer, the general, of the Carmelite order. In 1890, he was beatified by the Catholic Church.

He became the most prolific and the most popular of the Renaissance poets in all of Europe. His poems total over 55,000 lines besides various works in prose. Shakespeare in his works refers to him. Under the title "Parthenice," he wrote in Latin seven different epic poems, one on the Virgin Mary and one each on six different female saints. One of these epic poems was on St. Apollonia, the patron saint of diseases of the teeth. It was written about 1500 and

was first printed in the Bologna edition of his works, published in 1502. The poem contains six hundred and sixty-six lines.

In this poem, the author takes free poetic license. Although there is good evidence that Apollonia was the daughter of a middle-class Greek merchant of Alexandria, he calls her a princess and descendant of ancient Egyptian Pharaohs. While we know that Apollonia at the time of her martyrdom, in 249 A.D., was a spinster over fifty years of age, Mantuanus gives her a youthful beauty surpassing that of the nymphs of the Nile and calls her a young maiden scarce ripe for the marriage bed.

The description by Mantuanus influenced the pictorial and sculptural representations of this popular saint. Before his poem was written, she is shown as a middle-aged woman in painting and sculpture, but after this poem appeared, the representations of Apollonia became more and more youthful, until a wooden statue of the Eighteenth Century now in Mürztal shows her as a girl apparently about twelve years of age.

Many of the English poets refer to the teeth. The best known of these references is by Robert Burns (1759-1796) in his poem of six stanzas entitled "Address to the Toothache," of which the familiar first stanza reads:

My curse upon thy venom'd stang
That shoots my tortured gums alang
And through my lugs gies many a twang
Wi' gnawing vengeance
Tearing my nerves wi' bitter pang
Like racking engines.

In the library of Northwestern University Dental School are two poems, the sources of which are not known, in the form of clippings from newspapers or magazines. One of these, of eighteen lines, is entitled "Lines Written in a Fit of the Tooth-Ach" and is signed "Trin. Col. 1786." The other has twenty-four lines and is entitled "Lines Written to a Lady." The lady, it seems, "had a loose tooth extracted, and fastened in again by drilling a Hole through it, and passing two Ligatures, by which it was tied to the Tooth on each Side." The poem, it is stated, is from the *Morning Post,* 1793. Reimplantation of teeth was a common practice at that time. It is probable that both of these poems appeared in England, for at these dates there was no Trinity College and no paper by the name of the *Morning Post* in the United States, but such a college and such a newspaper existed in England.

DENTISTRY IN FRENCH POETRY

The French poets of the Eighteenth Century make frequent reference to the teeth, with occasional mention of dentistry.

Julien Marmont, son of a surgeon-dentist, was a prominent surgeon-dentist in Paris in the early Nineteenth Century, beginning practice about 1800. His name appears in the commercial directory of Paris in 1807, and continues until 1830. In 1803, he invented the mouth mirror. This invention brought him to the attention of the Empress Josephine, the wife of Napoleon Bonaparte, and he became her personal dentist.

He states that in 1807 he wrote a treatise on diseases of the teeth, but it is not listed in bibliographies. In 1824, he wrote a poem in four cantos of over 1,300 lines, entitled "L'Odontotechnie ou l'Art du Dentiste." This was published in Paris as a duodecimo volume in 1825. In the second canto, he devotes thirty lines to his reasons for inventing the mirror, which was to avoid extracting the wrong tooth. Michel Auguste Delmond wrote in verse a criticism of Marmont's poem. Lawrence P. Brown

has reviewed Marmont's poem, with quotation of extracts, in THE JOURNAL.

Later, Marmont published a prose work entitled "L'Esthiomenié." The first edition appeared in 1830. The third edition of this was printed in 1836 at Geneva, Switzerland, where Marmont was then in practice. He designates himself on the title page as expert "chiurgien dentiste et esthiomensateur." This work describes his method of treating carious cavities by injection under pressure of a chemical vapor, which he says that he had successfully used for over thirty years.

DENTISTRY IN ENGLISH POETRY

The best known poems on dentistry in English are the two by Solyman Brown (1790-1876). The first was "Dentologia," a descriptive poem in five cantos with a total of 846 lines, published in New York City in 1833 with notes by Eleazar Parmly under whom Mr. Brown was then a student. The second poem was "Dental Hygeia," published in New York in 1838 and containing three cantos with a total of 854 lines. Lawrence P. Brown has reviewed these two poems, with extensive quotations from the first of them, in THE JOURNAL.

Solyman Brown was one of the most highly educated men in dentistry of the middle of the Nineteenth Century. He graduated from Yale College in 1812. He studied for the ministry and was ordained. At about forty years of age, he took up dentistry and became influential in the early history of American dentistry.

He was secretary of the Society of Surgeon-Dentists of the City and State of New York, founded in 1834. He was one of the three members of the original publication committee of the *Journal of Dental Science*, the first number of which appeared in June 1839. Later, he was a member of the editorial board of that journal, and his membership on that board probably accounts for the excellent English diction that characterizes the articles in the early volumes of that journal.

One is tempted to infer that Marmont's poem was the stimulus which induced Solyman Brown to venture into poetry on dentistry. There appears no evidence to support this inference, except that Brown's poem followed by but eight years that of Marmont. The internal evidence is against such an hypothesis. In 1818, Solyman Brown published in New Haven a volume entitled "An Essay on American Poetry." It is in verse and in three parts with a total of 872 lines. As an appendix, there are twenty-nine fugitive poems by the same author on a wide variety of subjects and in a wide variety of meters. Thus, Brown was the author of at least thirty poems prior to the appearance of Marmont's poem.

All three of Brown's long poems are of approximately the same length, between 850 and 900 lines, while Marmont's poem has more than 1,300 lines. All three of Brown's long poems are in ten-syllable meter, the "Essay on American Poetry" being blank verse, "Dentologia," rhymed couplets and "Dental Hygeia," heroic couplets. Marmont's poem is in thirteen-syllable meter, or what was known as female alexandrine couplets. Occasionally, his Muse limps and there appears a line of twelve syllables, which characterized the male alexandrine couplet. The stately alexandrine couplet was a favorite with French poets. Thus, in length and in meter, Brown's three long poems are all similar, but all much different from Marmont's poem.

With the exception of advertisements and casual references, I have been un-

able to find any item of American dental literature in the Eighteenth Century, and I believe the following poem to be one of the earliest items in the field of American dental literature.

The author of this poem is not indicated, but the man to whom it is addressed is well-known. James Gardette came with the French army as a surgeon-dentist during the Revolutionary War. At the end of the war, he left the army and settled first in New York City to practise. He practised in Philadelphia from 1784 to 1829 and was resident there when this poem appeared. He was one of the most prominent surgeon-dentists in the United States in the later years of the Eighteenth Century, and the preceptor for many students who became prominent in early American dentistry.

This poem is found in *The American Museum,* a general literary magazine published in Philadelphia. It appears in the volume published from July to December 1790, on page 4, in appendix I, on poetry.

In this appendix, certain poems are noted as original. This one is not, which is an indication that it was copied from some other publication. The probability is that the publication was a Philadelphia newspaper, since every newspaper of that period carried original poems. The original source has not been found. If found, it may give some indication, either by signature or by editorial note, as to the identity of the author.

The poetic form of this poem is ten-syllable heroic couplets, a favorite form in the Eighteenth Century for poems on serious subjects.

Lines addressed to mr. James Gardette, dentist.

Gardette! 'tis thine by study to improve
The bloom of beauty and the breath of love;
To chace from ev'ry cheek distress and pain,
And bid each drooping fair one, charm again.
What tho' the glowing cheek and sparkling eye
Some faint sensations to the heart supply,
Celia but half her wonted charms can boast—
A faded trifler, a degraded toast—
Unless the instrument of eloquence
Through iv'ry's double rows delight each sense,
And to her wond'ring lover's soul impart,
Nature's sweet sounds, attun'd by studious art.
Even tho' genius dignify the fair,
Pleasing her words, and elegant her air,
The charms of sound and sense we often slight,
Unless another sense our souls delight;
Unless Arabia's sweets assistance lend,
And ev'ry charm with added grace befriend.
Beauty, 'tis known, too oft disgusting grows,
A vapid, scentless, nay, disgusting rose,
Art can no more the fading leaves adorn;
It withers on its slighted, pitied thorn.
Gardette! advance in thy delightful art;
Promote politeness, and inform each heart,
Add (man to charm, and woman to improve)
To beauty's bloom the balmy breath of love.

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SPEECH RECONSTRUCTION AFTER PROSTHESIS: REPORT OF A CASE*

By HORTON D. KIMBALL, D.D.S., D.D.Sc., Detroit, Mich., and JOHN H. MUYSKENS,† M.S., Sc.D., Ann Arbor, Mich.

THE first portion of this paper will be immediately recognized as a report of the type of case that is often seen in the office of the prosthodontist, the case presenting nothing out of the ordinary. A detailed discussion is given to establish this very commonness.

The latter part presents, in abstract form, a classification of speech elements that has not appeared in the literature, neither of the dental field nor of experimental phonetics. The integration of the two fields is of prime importance during these days of synthesis in science.

Dental literature records many cases of prosthesis similar to the type discussed in this article. Little has been said about the speech of persons afflicted as was this patient. As long as a vicarious or compensatory adjustment is active without too much sudden change, no easily noticeable defect of speech results.

Recognition of the physical deformity is but a part of a complete diagnosis. It should be noted that, in such oral deformity, the lips and tongue cannot function successfully in occlusion and constriction. Special adjustments are therefore necessary in which some of the immovable hard parts function for otherwise active soft parts of the mouth. This makes necessary a compensatory movement by the occluding and constricting soft parts resulting in what has been designated as vicarious movement. Further, such subjects rarely escape an unfavorable self-analysis. This patient showed a marked break in personality. Apology manifested itself in her guarded speech, in her dress and social contacts. Self-imposed inferiority made of her the shrinking violet.

When first seen, the patient presented the general appearance shown in Figure 1. She had lost her first molars when a child, with resultant drifting of the re-

*Report made in connection with work being done by Dr. Kimball in the Prosthetics Department of the University of Michigan College of Dentistry.

†Associate professor of experimental phonetics, University of Michigan.

maining teeth and some closure of the bite. There was, in addition, a gradual extrusion of the mandibular anterior teeth, and a continual pressure exerted by them at the point where they occluded with the lingual surfaces of the four maxillary anterior teeth. This caused the maxillary central and lateral incisors, and the labial process in connection with them, to be forced slowly outward.

Fig. 1.—Appearance of patient when she first presented herself. Note her inability to bring her lips together.

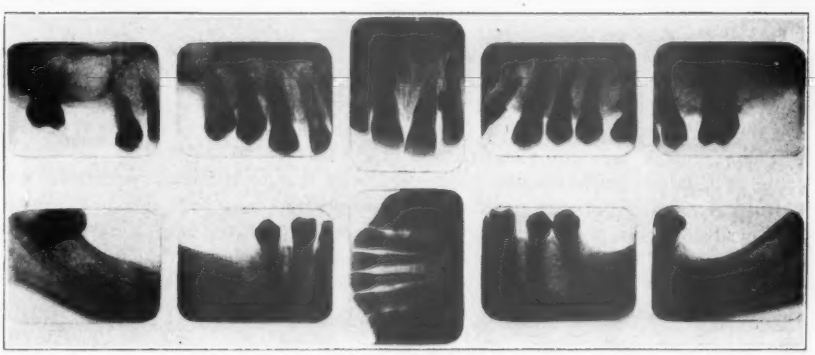


Fig. 2.—Roentgenograms taken of case when first seen.

At various times, the patient had certain other teeth extracted, so that, up to about four years ago, she had lost the following teeth in addition to the first molars: right upper third and lower second and third molars; left upper second and lower second molar and second bicuspid.

It is not known when the different teeth were extracted, but the patient stated that after the last teeth had been extracted, four years ago, there was a

rapid closing of the "bite" and the maxillary anterior teeth were forced out much farther than ever before.

When she finally came in, the four maxillary incisors had been pushed out anteriorly to such a degree that she was unable to bring her lips together when her mouth was closed. The bite had closed to a marked degree, and the mandibular incisors had extruded so greatly that a deep groove had formed where their incisal edges came in contact with the tissue in the anterior part of the palate.

The lower left third molar had tipped mesially and lingually until only the distobuccal cusp was in occlusion.

The lower bicuspids had drifted distally, considerable space between them and the cuspids resulting.

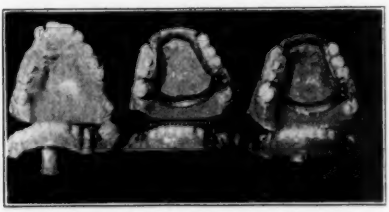


Fig. 3.—Design of maxillary case, to minimize tongue interference.

There had not been so much drifting of the remaining maxillary teeth.

Roentgenograms (Fig. 2) revealed: 1. An apical abscess on the maxillary right lateral incisor. 2. An area of infection at the apex of the maxillary right central incisor. 3. Some bone resorption about the mandibular anterior teeth and also considerable recession of the pulps in the same teeth. 4. A fragment of an old filling in the region of the mandibular left second bicuspid. The remainder of the mouth was healthy, and since the fragment of filling had not created trouble, it was not disturbed.

It was considered impractical and completely out of the question to attempt orthodontic regulation. Treatment of the infected maxillary right central and lateral incisors was also decided against.

The following procedure was adopted: Cast crowns were first placed upon the lower left third molar and first bicuspid and the lower right first and second bicuspids. In this manner, the bite was opened about 3 mm., which seemed at the same time to bring the mandible slightly forward.

The crown on the lower left third molar was built up in order to bring it into effective occlusion with the tooth above it. The crowns on the left and right first bicuspids were contoured to fill in the spaces between them and the cuspids.

The patient was given a few weeks to become accustomed to the opened bite and to adjust herself to changes in speech and food taking.

A removable prosthesis was constructed for the lower jaw. Clasps were placed on the left first bicuspid, and right second bicuspid and occlusal rests were placed on the left third molar and the mesial aspect of the right first bicuspid. These replaced the lower left first and second molars and the second bicuspid as well as the lower right first molar.

The lingual bar was made small and was placed low so as to interfere as little as possible with the tongue in movements of occlusion and constriction.

At this time, the incisal edges of the lower anterior teeth were trimmed down until they presented a plane incisive surface. It was felt that there was no endangering of the pulps in this process because of the amount of recession shown in the roentgenograms. Again, a few weeks elapsed for retraining of the muscles.

A removable upper prosthesis was now constructed in the form of a palatal bar,

thin and flat, placed in the second molar region (Fig. 3). Since there is no kinesthesis in the tongue, it depends for control on touch and pressure. The tip of the tongue is sensitive to the point of being able to detect any interference from 1 to 3 mm. in size; while the sides and posterior two-thirds are only sensitive to an interference from 6 to 8 mm. in size. It is, therefore, best in these cases to keep the palatal bar well back in the posterior part of the mouth, about in the second molar region. A wide thin bar is, of course, more readily tolerated than a nar-

Fig. 4.—Appearance of patient one week after operation and at the time of insertion of intermediate prosthesis. Note that her lips are closer together.

Fig. 5.—Completed case. Photographs taken three weeks after insertion of final prosthesis and about four months after operation. Note that the lips are now together and can function normally once more in speech.

row thick one. From each end of the bar, an arm was extended anteriorly along the lingual surfaces of the teeth supporting in turn the two central and lateral incisors. These were attached as bridge teeth.

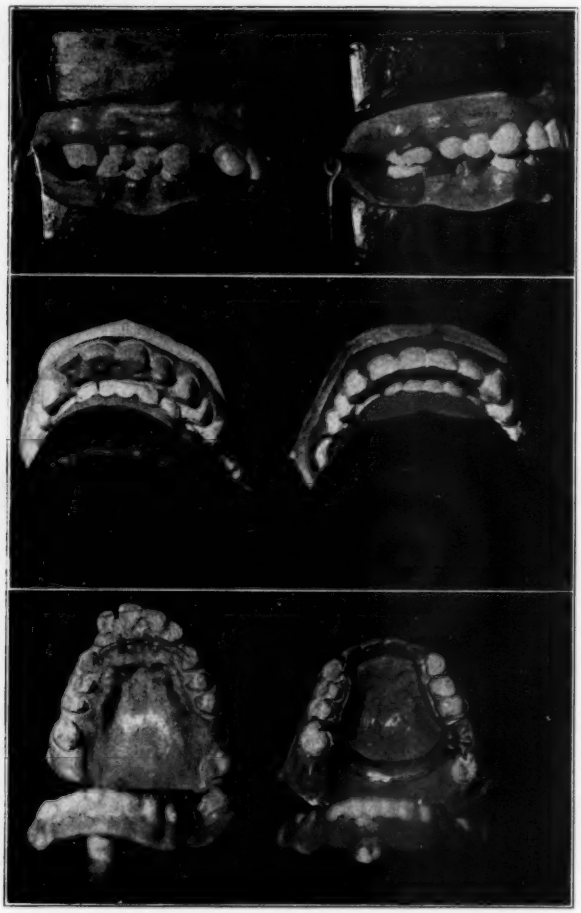


Fig. 6.—Models illustrating appearance of case as it first presented and after completion.

A large dummy tooth was placed in the space left by the loss of the upper left first and second molars. This space had been partially closed by the anterior drift of the upper left third molar. Retaining clasps were placed on the upper left third molar and second bicuspid, and on the upper right second bicuspid. Short clasps were placed on the cuspids. In this temporary intermediate case, the four anterior teeth were placed with a trifle less

Consonantal Groups	Bilabials		Labio-dentals		Interdentals		Dentals		Prepalatals		
	Sonant	Surd	Sonant	Surd	Sonant	Surd	Sonant	Surd	Sonant	Surd	Sonant
1. Plosives and stops	b	p					d	t			
2. Nasal continuants	m						n				
3. Fricatives	w		v	f	ð	θ	z	s	ʒ	ʃ	j
							and combinations, see palatograms				
4. Vowel Groups											
Rounded vowel series											
ɔ—ball, Paul, all, fall							ɑ—bull, pull, full				
ʌ—but, putt, tut, tut! cut							o—boat, pole, foal, cold, goal				
							u—boot, toot, shoot, fool, cool				

Fig. 7.—Various consonantal and vowel sounds grouped according to function.

protrusion than in their natural placement but with a little more than was to be given in the completed case. The upper incisors abutted the gum.

The four upper anterior teeth were now extracted. The gums were reflected back and sufficient labial (alveolar) process was removed by rongeur forceps to permit the upper lip to fall into normal position (allowance being made for resorption and shrinkage of the process after healing had taken place). The intermediate partial prosthesis was inserted in the mouth immediately after extraction and alveolectomy. The patient wore the prosthesis until the gums had fully healed and settled. The photographs (Fig. 4) were taken one week after the operation.

Three months elapsed for a readjustment in the vegetative movements and speech, and to allow for the settling and healing of the tissues.

After this, the four anterior teeth on the prosthesis were removed and reset in normal alinement, this being the permanent arrangement.

After three weeks, the photographs in Figure 5 were taken.

Figure 6 shows models illustrating the original condition as compared with the case when it was finally completed.

In this type of case, the apparently slovenly speech appears to be extremely defective. So many of the consonants and vowels are made with all manner of compensations. These compensations in an intelligent person are to be expected. The result in the totality of speech may seem to be exceedingly slovenly and varied, suggesting many and multiple bad sounds. This is in reality the product of but one variation in structure, namely, the maladjustment of the teeth. Since 80 per cent[1] of all our specific speech movements

1. Shohara, H. Helen: Abstract of thesis, Quart. J. Speech, June, 1935, pp. 343-348.

Consonant		Movement: Occlusive-circular	Movement: Constrictive	Reduction of occlusion or constriction by longitudinal contraction	Both
p	as in	hop, mop, stop		pot, par, put	mopping, flipping
b	" "	rob, daub, tub		board, ball	rubber
m	" "	ham, ram, lamb		man, mat, mum	hammer
t	" "	hat, rat, bat		tack, top, ton	hatter
d	" "	rod, bad, sod		dog, do, dull	rodent
n	" "	ran, tan, sun		nat, note, not	running
w	" "	how, sew, new		wool, wet, warm	mewing
		This has no consonantal value here			
v	" "		nave, love, stove	valley, vat, varry	never
f	" "		stuff, cuff, calf	full, fall, fat	buffer
ð	" "		weather, father	than, then, there	feather
θ	" "		myth, filth, stealth	thistle, thumb	without
s	" "		miss, hiss	sister, sit	hissing
z	" "		razz, jazz, maise	zebra, zoom	gazelle
ʃ	" "		mush, push, slush	sugar, sure, shun	mention
j	" "		Never occurs here in English but in the vowel [i]	union, yes, yea	

Fig. 8.—Words illustrative of various vowel and consonantal sounds outlined in Figure 7.

are made in the anterior part of the mouth, it will be readily seen how important it is to have a symmetrical positioning of the anterior teeth.

One of the many ways in which the consonantal and vowel sounds which constitute speech may be classified is as follows:

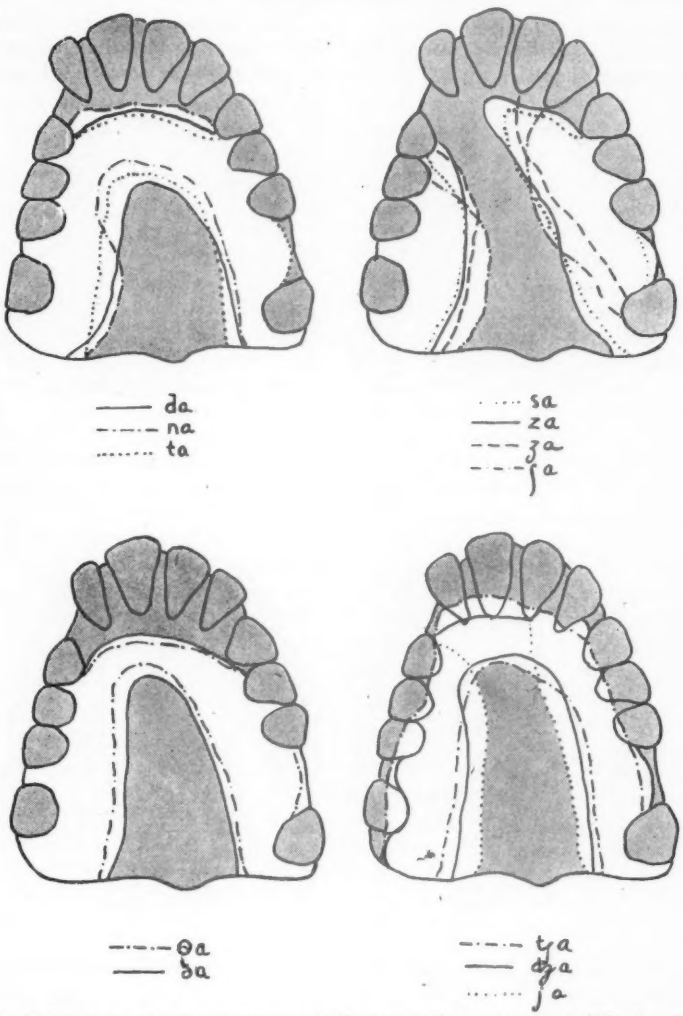


Fig. 9.—Palatograms showing diagrammatically how patient encountered difficulty with consonantal sounds before the correction was made.

1. Bilabial and dental stops and explosives.
2. Bilabial and dental continuants, initial and final.
3. Bilabial, labiodental, interdental, dental and prepalatal fricatives.
4. The rounded vowel series, which are in reality the product of bilabial tetany.

Figure 7 presents in tabular form this method of classification.

Figure 8 gives words that are illustrative of the various vowel and consonantal sounds.

The foregoing type of classification keeps recurring in dental literature, and is quite generally accepted. It should be remembered that even phonetic symbols used in these forms, although an improvement on the alphabet, do not adequately depict the "sounds" of speech.

Emphasis has constantly been placed

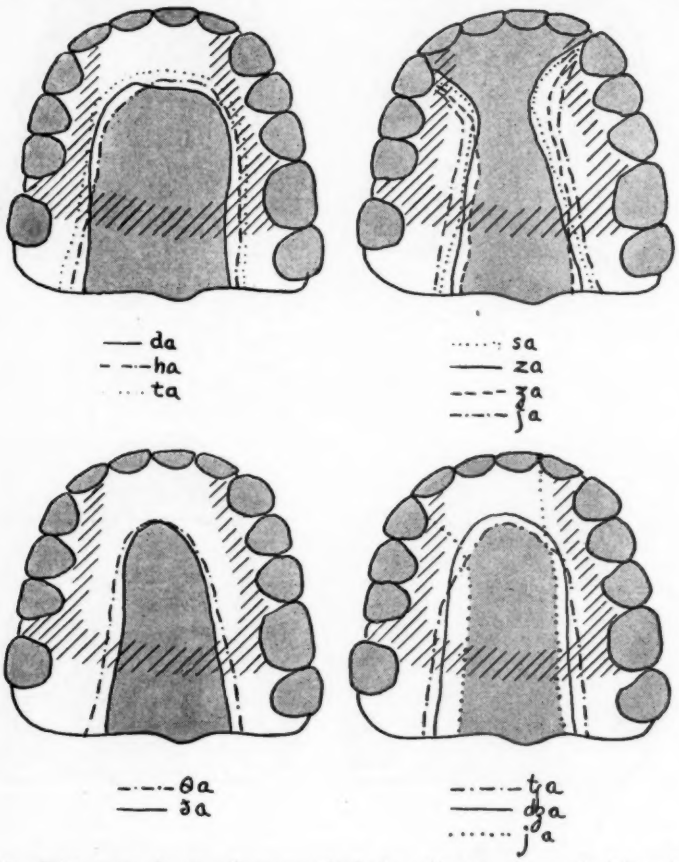


Fig. 10.—Palatograms showing diagrammatically how this correction resulted in such a vast improvement in the patient's speech.

on the static positions of the various muscles used in speaking. These static positions, (in reality, momentary rest positions) do not at any time play a part in the speech process as a whole. One must keep constantly in mind that all speech is dynamic, and that muscles move to produce the sounds. After all, the dentist is not interested in sounds and symbols for sounds, but rather in the actual moving muscles which are productive of them.

In the classification just presented, and in all other methods of speech classification, the moving muscles have been left out of consideration. These systems of classification are of value only as far as they more or less mechanically catalog various speech sounds, but further than that they are useless.

A reclassification of all of the consonants will give a more dynamic picture of the interference and necessary compensatory adjustment.

There are two large groups of muscles working to produce the opening and closing of the tube when speech is formed[1]: 1. A set of muscles circularly arranged about the openings of the mouth, pharnyx and larynx. 2. A set of longitudinally arranged muscles about this continuous tube. These muscles, working in definite serial order, produce the functions of swallowing and of sucking, and later on integrate with the muscles of chewing. They have been conditioned (1) to produce complete occlusion of the tube, and various degrees of constriction of the tube, and (2) to reduce the foregoing conditions, that is, to enlarge the tube by their contractions.

Applying this system to the patient in question, one has then the consonants produced by: 1. The orbicularis oris muscle, and by the opponents of the orbicularis oris, the triangularis and the caninus muscles. 2. Combinations of the styloglossus and genioglossus in constrictive and occlusive or peristaltic order; or reducing order.

Bearing in mind that the patient had by slow degrees been forced to make speech readjustments, it will be understood that all consonants, normally products of these muscles, were made by other muscles substituting for those unable to function properly. Likewise, the rounded vowels, which are functions of the above-mentioned peristaltic order, were the products of but half of the orbicularis oris and of the other muscles or hard parts serving vicariously for the half which had become afunctional. The resultant sounds, lacking the precision of movement, lacked the clarity of tone. Especially in the case of the fricative is this loss of sharpness and specificity productive of what is so thoughtlessly called slovenly speech.

The palatograms in Figures 9 and 10 illustrate diagrammatically the contact areas made in this case by the interdental, dental and prepalatal consonants. Figure 9 presents these contacts as made before prosthetic correction, and Figure 10 illustrates the same consonants as produced after prosthesis.

The various dotted lines represent different consonantal sounds in combination with the vowel a as described in the legend accompanying each diagram. The light areas bounded by these lines indicate the regions actually touched by the tongue in the formation of these consonantal sounds. The shaded parts are the points where no contacts are made, while the diagonal lines in Figure 10 show the area covered in the palate by the partial denture that was constructed for this case.

A close study of the diagrams in Figure 9 will enable one to see quite clearly why the patient encountered such difficulty with consonantal sounds before

the correction was made. By a similar study and comparison of Figure 10, one can readily understand how this correction made such a vast improvement in the patient's speech.

Care should be taken in the interpretation of the palatograms to consider that the contact area is the product of movements resulting in consonants, and of position tetany of other muscles, resulting in vowels.

Fricatives, even when produced under favorable conditions, carry so slight a power to stimulate the listener that they are rapidly losing their differing elements, as for instance in such examples as "gim-me," for "give me," or "wi-fi dollars" for "with five dollars"; etc.

The specificity of production of all these consonants is determined largely by: (1) the resultant sound check from hearing, and (2) the touch pressure, kinesthesis pattern of control sensations.

Now, since the patient, in hearing others speak, was constantly reminded of her inability to pattern her speech after the acceptable standard, she, by this very self-analysis, developed a complex about her speech which showed in unwillingness to make contacts with others of her kind. A whining apology and a broken personality were the result.

Attention should here be called to the manner of constructing the prosthesis: The intermediate, inserted immediately after operation, slowly permitted the afunctional lip to come back into the play of speech movement. It likewise began to reform the conditions under which the vicarious movements had developed. In this connection, it should be noted that the subject began to appreciate, perhaps from observation of herself in a mirror, that the seeming sneering smile was beginning to correct itself, and she, by practicing before the mirror, unwittingly aided the reformation of speech movements connected with the obicularis oris and opponents. Both the intermediate and the final prostheses, by a reconstruction of favorable conditions for the fricative group, mechanically sharpened the auditory, kinesthetic and touch pressure control over movement.

In this connection, it should also be pointed out that the highly exact local sensitivity of the tip of the tongue and the relatively gross sensitivity of the sides and blade of the tongue were taken into consideration in the construction of the case. No bar interfered with the tongue tip touch pressure controls, and the wide thin bar in the arch of the palate gives sufficient strength to the case without disrupting the already badly controlled speech processes.

Little mention has been made of the lower prosthesis in this discussion of speech, since it plays so small a rôle in the walling and definition of movement. It should be noted that the reformation of the leverages of the muscles of the tongue was greatly enhanced by this fuller shelf which acted as a rest for the base of the tongue, the vicarious elements within the tongue muscle groups being thereby reduced enormously.

This prosthesis has been in place now for over three years, giving perfect satisfaction. The improvement in speech, and the general appearance, as well as the psychologic attitude, has been quite amazing.

This paper is attempting to show the importance of speech and phonetics as related to dental prosthesis and by its joint authorship stresses the fact that the speech specialists and the mental hygienists are working with the dental specialists in the care of personality and toward more satisfactory adjustment.

THE RESTORATION OF ABRADED ANTERIOR TEETH

A PORCELAIN JACKET-CROWN TECHNIC OF SPECIAL UTILITY IN BITE-RAISING CASES

By SAMUEL MILLARD, D.D.S., and M. RUSSELL STEIN, D.D.S., New York, N. Y.

ONE of the most difficult technical problems involved in the building up of closed bites is the restoration of severely abraded anterior teeth. Although abraded anterior teeth are found most frequently in persons requiring relief from intermaxillary closure, they are not common to all such cases.

The closed bite manifests itself in a variety of clinical pictures. There are, however, two distinct and opposite forms: One in which there is a pronounced overlap of the anterior teeth and the other in which there is extensive abrasion of both anterior and posterior teeth. In most abrasion cases, the upper and lower incisors meet in a tip-to-tip relationship in either centric or protrusive occlusion. The upper anterior teeth usually suffer more destruction than the lower anterior teeth. (Fig. 1.) In many abrasion cases, more than half the crown is destroyed on the labial side and all of the crown on the lingual side. (Fig. 8.) Despite the fact that they are much smaller, the lower anterior teeth resist abrasion better than the upper ones.

In the present paper, we shall not discuss how or why the unequal abrasion occurs; we shall simply direct our attention to the problem of reconstruction.

Let us assume that the bite has been raised to the proper height on the posterior teeth and that sufficient opening has been created for the restoration of the incisors and cuspids to the required length.

Severely abraded incisors in bite-raising cases usually do not present enough tooth structure to make a satisfactory preparation for a porcelain jacket crown. Some operators devitalize the pulps of such teeth and construct gold cores or cast bases with posts in the root canals. This type of restoration may be mechanically adequate, but it is unsatisfactory from other points of view. Pulp devitalization is uncalled for except when the pulp is exposed or diseased. In most cases of abrasion, there is considerable deposition of secondary dentin and consequent pulp recession. (Fig. 2.) When no secondary dentin is deposited, the pulps are exposed, for the abrasion is carried beyond the original incisal limits of the pulp chamber.

Once the pulp is devitalized, the root is susceptible to infection. Even in the absence of pathological symptoms, such teeth are often extracted subsequently as suspected foci of infection. Furthermore, focal infections are more seriously considered when the patient is advanced in years, and it is at this time that advanced abrasion is most often found.

Every natural tooth helps in the maintenance of the newly raised occlusal relationship. It is important, therefore, to retain the roots and preserve their vitality. Many anterior teeth have been subjected to root therapy because the crowns were considered too short for porcelain jacket-crown preparations. A good rule to follow is *never devitalize unless absolutely necessary*.

The following procedure for the restoration of severely abraded anterior teeth is therefore suggested:

1. Remove the undercuts in the remaining portions of the crowns by slightly

trimming with stones and disks. (Fig. 3.)

2. Construct temporary base metal crowns. (Acolite is good for this purpose.)

The direct or indirect method may be used, according to the option of the operator. The acolite crown is partially filled with base-plate gutta-percha and is forced over the tooth until the gutta-percha extends slightly beyond the cervical margin,

Fig. 1.—Set of casts of practical case, showing extreme abrasion of upper anterior teeth and comparatively good state of preservation of lower anterior teeth.

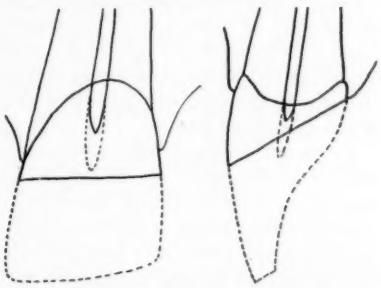


Fig. 2.—Diagrams of labial and proximal aspects of incisor, showing extreme abrasion and the extent of pulp recession. Had the pulp not receded, it would have been exposed.

forcing away the gum tissue. (Fig. 4.) These crowns are worn for several days until the gum has receded about 1.5 to 2 mm. During this period, they may have to be repacked two or three times. The tooth surface should always be dried before the acolite crown is applied, because moisture breaks adhesion. A little chlorrosin applied to the tooth helps keep the crown in position.

3. After the gum has been forced away, the teeth are tapered slightly from the farthest exposed levels of the roots to the tips of the crowns. (Fig. 5.)

4. One of two procedures may now be followed: (a) A preparation with no shoulder at all or (b) a preparation with a shoulder on the labial side only.

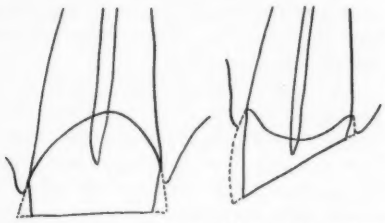


Fig. 3.—Diagrams of labial and proximal aspects of worn incisor, indicating initial trimming of crown.

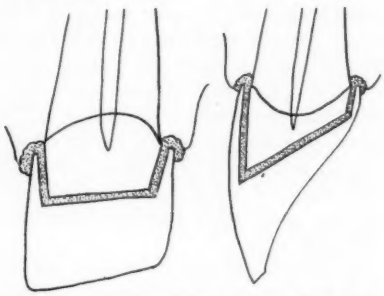


Fig. 4.—Cross-sections illustrating base-metal crown and gutta-percha forcing away gum tissue.

The second procedure has the advantage of showing no gold, not even under the gum. In this instance, change of color of the gum tissue is avoided. (Fig. 6.) In procedure (a), the tapering of the stump completes the preparation of the tooth.

5. Thimble impressions of compound are taken of each individual preparation. Alloy dies with long bases are packed.

6. A wax bite and a plaster impression are taken to include the anterior teeth and the bicuspids. The alloy dies are set in the impression; a cast is poured, and the case is mounted on an articulator with the alloy dies set in the cast.

7. Gold copings are constructed on the dies. The coping may be waxed up directly against the alloy die or against a platinum matrix swaged on the die. The latter method is preferable. The coping is made

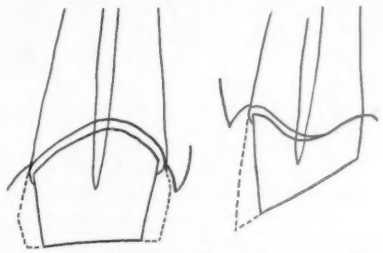


Fig. 5.—Diagram illustrating completed preparation of tooth.

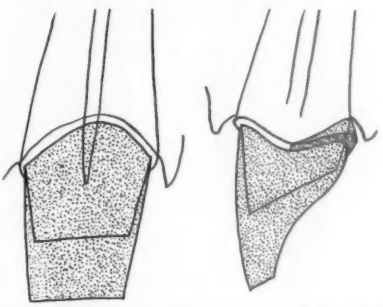


Fig. 6.—Diagram illustrating coping with lingual shoulder that is continuous with the labial shoulder of the tooth preparation. The apron is tapered to a knife-edge. There is no gold under the gum on the labial surface.

with an apron embracing the mesial, lingual and distal surfaces of the root which were exposed by the forcing away of the gum. The apron affords retention. The margin of the apron is tapered to a knife edge. (Fig. 6.) At the normal gum line, the coping is sufficiently thick to form a shoulder. (Fig. 6.) On the type (b) preparation, the shoulder of the coping is continuous with the partial shoulder on the labial side of the root. The labial surface of the gold coping may be very thin. If an open-face coping is desired, a thin band of gold at the cervical line will afford adequate retention. (Fig. 10.)

Three-quarter crown types of preparations for copings are contraindicated in this work because the remaining usable tooth structure is neither long enough nor strong enough for retention.

The coping has a triple service. By means of the apron, it affords strong retention; it creates a shoulder around the root without the sacrifice of tooth structure, and it permits the necessary elongation for the porcelain jacket crown preparation.

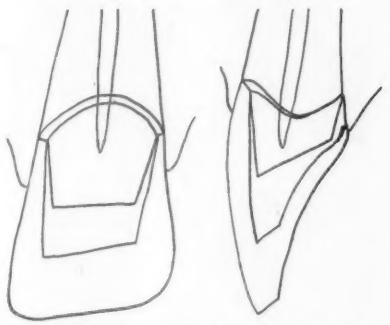


Fig. 7.—Cross-section of jacket and coping in place, illustrating the position of the pulp, which has not been disturbed throughout the reconstruction.

8. When the copings are completed, they are placed on the root stumps in the mouth to ascertain accuracy of the fit and proper length and shape. The case is now ready for the construction of the porcelain jackets.

9. A new bite and plaster impression are taken with the copings in position in the mouth.

10. The copings are removed from the

mouth and set into the plaster impression. The original dies are then set into the copings. A stone cast is poured and the case is articulated.

11. Thimble impressions of compound are taken of each individual core on the cast. Alloy dies are packed into these impressions.

12. A plaster impression is taken of the last cast with the gold copings in position. The new alloy dies are inserted into this impression and the final cast is poured and articulated.

Fig. 8.—Cross-sections of upper and lower incisors before and after reconstruction. Although the crown was nearly completely destroyed by abrasion on the lingual side, adequate retention for a jacket is provided by the gold coping.

13. On this final cast, the porcelain jackets are constructed.

14. The jackets are finished and adjusted to the gold copings of the previous cast.

15. The work is assembled in the mouth and perfected for contact points and occlusion. (Figs. 7 and 8.)

16. The copings are cemented in the mouth. *Coping and jacket are never cemented at the same time.* When the cement has hardened and the surplus has been removed, the jackets are cemented in. This eliminates the possibility of misplacing the copings.

The above-described procedure is particularly advantageous in cases of abraded lower anterior teeth where there is no

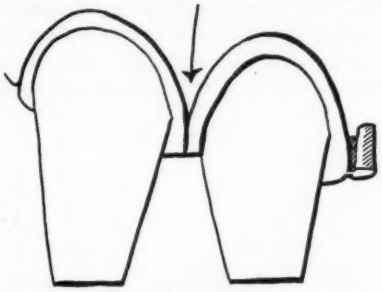
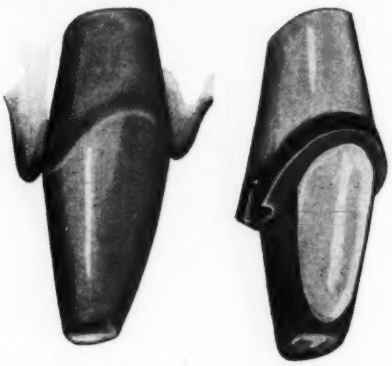


Fig. 9.—Diagram illustrating high shoulder at junction of coping and pontic, in order to conform with v-shape of gum.



A B

Fig. 10.—A, Shoulderless tooth preparation; B, open-face gold coping with shoulder built large enough on proximal side to receive lug of pontic.

room for a shoulder on the mesial and distal surfaces of the root.

Where an anterior tooth is missing, the same technic may be used with modifications. We shall briefly describe a case in which a lateral incisor is missing and the other anterior teeth are badly abraded.

1. The roots are prepared as in the technic described above. Particular attention is given to the central incisor and cuspid tooth on each side of the space created by loss of the lateral incisor. Because these teeth are to serve as abutments, their cores must be as firm as possible.

2. The cuspid coping which is to carry the pontic is prepared as an ordinary coping except for the fact that the shoulder is a little higher on the mesial side in order to afford more surface for a soldered joint and a v-shaped space for the papilla beneath. (Fig. 9.)

3. On the central incisor coping, the shoulder is built up sufficiently to receive the preparation for a small dovetail lug. (Fig. 10.)

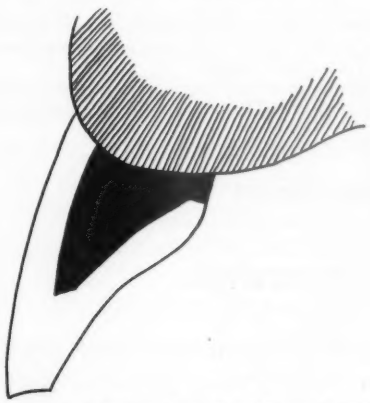


Fig. 11.—Cross-section of gold pontic with no shoulder on labial surface. The jacket butts up against the gum tissue on the labial side.

4. A wax bite and a plaster impression are taken with the two copings in position in the mouth. A cast is made with the original alloy dies as seatings for the copings.

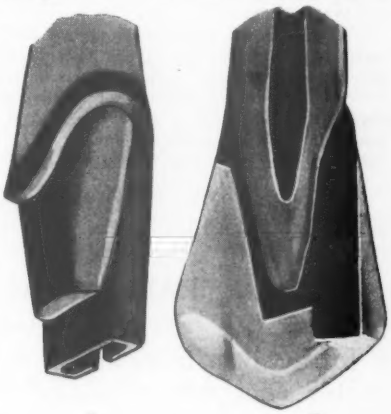
5. A pontic consisting of a gold core is cast for the space between the copings. On the labial side of the pontic, there may be either a finely tapered shoulder or no shoulder at all. (Fig. 11.)

6. The lug is cast with the core. The core is soldered to the cuspid coping. The gold framework is assembled on the model and then tried in the mouth.

7. An impression is taken of the anterior teeth with the framework in position. The framework is set in the impression and a cast is poured.

8. The new cast with the gold cores and framework is now treated as in the first technic.

There is still another useful modification of this technic in which one of the abraded anterior teeth has to be used as an abutment for precision attachment bridgework. The tooth is prepared as described above. Maximum retention is given to the coping. The coping is made with a flange for the box of the attachment. The procedure is then the same as in the above-described cases. A porcelain jacket is built around the remaining part of the three-quarter core. (Fig. 12.)



A B

Fig. 12.—A, Gold coping with box for precision attachment; B, cross-section of A, showing relationship of pulp, dentin, coping and jacket.

The coping technic is sufficiently flexible to be applied in a wide variety of cases.

113 West 57th Street.

THE JOURNAL *of the* AMERICAN DENTAL ASSOCIATION *and* THE DENTAL COSMOS*

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Published by the American Dental Association
212 East Superior St., Chicago, Ill.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association.

Communications intended for publication in the scientific or literary pages of THE JOURNAL should be addressed to the Editor. All advertising or business matter should be sent to the Business Manager.

Subscription is included in the annual membership dues. The subscription rate to non-members is $5.00 a year in advance, this rate applying to both domestic and foreign subscribers. All foreign subscriptions are to be paid in United States money.

*In deference to the wish of the dental profession to control its literature, *The Dental Cosmos*, founded in 1859, was transferred by the S. S. White Dental Mfg. Co. as a gift to the American Dental Association, January 1937.

Editorial Department

RADICALISM IN DENTISTRY

RADICALISM in the affairs of men has in recent times been greatly deplored, and with much reason; but if there were no radicalism in the practice of dentistry, it is doubtful that there would be much progress. Thinking men are frequently called on to lament the damage done by lack of balance when men lose their perspective and run off at a tangent in some spectacular aberration, and doubtless there is justification for much concern in this regard. We have all seen evidence through the passing years of the undoubted harm brought about by the lack of mental balance called radicalism.

At times it would seem that more energy is required to right the ship and bring it back on an even keel after vagrant winds have blown it out of its course than to propel it from port to port. Dentistry has suffered greatly through running after false gods, and the

people have often paid the penalty. All of this we have known, and times without number we have lamented it. Frequently it has been the chief burden of our song, and much has been written on it. It is easy to recall numerous instances of failure and folly, of grief and woe following the advocacy of certain radical and attractive methods of practice.

Conservatism has been proclaimed from the housetops, and frequent pressure has been brought to bear in favor of a reduction of the tempo at which the profession has been traveling.

Well, what of it? A thousand times better that we launch out and sometimes make mistakes than that we rest content with the progress that has been made. Of all the fatal defects of humanity, smugness is very nearly the worst. To become static and satisfied is to vegetate mentally and grow stale. We frequently hear the remark "Those radical fellows must be watched." Assuredly they must, but that does not mean that we are to quench their enthusiasm or discourage their initiative. It does not contribute to the progress of the world, or of the profession, to trample on the ambition of every impulsive soul, or to clap a hand over the mouth of every energetic enthusiast who is bursting for expression. Better let him give vent to his fullest thought, and mayhap he shall emit something of real value to the world.

Timidity of thought is very nearly as bad as timidity of action, sometimes worse. To fail to speak your honest thought even at the expense of being called radical is to spend most of your time "traveling under wraps," and the race was never won without having the blanket taken off.

Much of the lament that we see touching radicalism is aimed at the younger men, but what folly it is to try to curb the spirit of youth. Youth may blunder at times through inexperience, but youth has within it the sinews of advancement and the possibility of progress. Take from the profession the spirit of youth, and you have very nearly quenched the fires that keep the glow of health and life pulsating in the arteries of professional men and women.

When we consider the youth of dentistry as a profession, we may well marvel at some of the evidences of its achievements. It is no vainglorious assumption to say that we as a profession have done

exceedingly well when our years are counted. At the pace we have been traveling, it is little wonder that we have occasionally made a misstep and in the vernacular have "come a cropper." Caution is of course necessary, but if we become too cautious, too timid, we are in danger of limiting our achievement to the vanishing point. In the game of life, a certain amount of hazard must be taken, even though our impetuosity may at times lead us to grief.

In every radical idea in theory or practice, there is usually the germ of a thought leading to ultimate fruitage. Let us not limit the output of our brains merely through fear that some of the product may be misleading and radical.

THE ARMY DENTAL CORPS

NO argument has been presented to refute the charge of inadequate dental service for the army personnel because of a sadly undermanned Dental Corps.

H. R. 3491, a congressional bill, sponsored by the American Dental Association, seeks to remedy this unfortunate condition. This bill will be enacted into law if and when Congress is informed of the need and importance of dental service in maintaining the health standard of the army.

Every dental society and all members of the American Dental Association should write their Representatives in Congress urging vigorous support of this measure. It is imperative that this be done now!

The bill must not be defeated or modified by amendment that would leave the Army Dental Corps still unable to provide even that minimum of adequate service which this bill would provide.

The last "Annual Report of the Surgeon General" credited the Dental Corps with doing approximately 30 per cent of the constructive dentistry required in the army.

The army needs dental officers at a ratio of one to every five hundred enlisted strength, as now allowed the navy. The Dental Corps also cares for dependents.

A Brigadier General serving as an assistant to the Surgeon Gen-

eral and as chief of the Dental Corps is provided for in the bill and is needed for efficient administration of this service.

The dental profession endorses this bill.

HEALTH SERVICE AS A GOVERNMENTAL OBLIGATION TO THE CITIZEN

As far back as 1928, a semi-official National Health Conference was called by President Hoover. The result of that conference was the appointment of a Committee on Costs of Medical Care, charged with the duty of surveying the medical facilities of the nation and suggesting ways and means of furnishing adequate health service to the people.

This was the real beginning of the agitation on the part of the various social health agencies for the adoption of some plan that would promise a health service available to all classes and at a cost those of moderate means could afford. The publication of the report of the Committee on Costs of Medical Care, with its suggestion that some form of state medical service or insurance medical service be adopted, was the signal for a most strenuous opposition on the part of the American Medical Association to any and all of the plans proposed and for the inauguration of a systematized propaganda against the adoption of any plan or system that would in any way interfere with the present methods of rendering health service.

The agitation of the question by the various social health agencies, on the one hand, and the oppositional propaganda by the medical profession, on the other hand, have continued through the following years with varying intensity, but without any satisfactory solution of the problem being offered by either party of interest. An apparent sympathetic attitude toward the medical profession by the public at large and an apparent lagging of interest in the matter on the part of the political and social elements gave suggestion of the probability that these latter agencies had given up the fight. But rather than having given up the fight, it seems that wide-spread efforts were being made through surveys and the gathering of data

to supplement their armamentarium with additional and stronger arguments for their cause.

In the meantime, the evolutional political and social development was leading more and more toward serious and sympathetic consideration of the service obligations of the Government to the individual. And now, some eight years since the inauguration of the move for more adequate health service, there has just been published the results of the studies and survey of a self-constituted group known as The American Foundation* whose survey and studies bid fair to reopen, with renewed intensity, the struggle to force the adoption of some plan that will furnish adequate health service to all classes, and at costs within the abilities of those of the lower income levels.

While the official protagonists of the present methods and those representing organized medicine do not admit the existence of any problem in relation to health service, practically all who responded to the request of The American Foundation to express their opinions on the present methods of rendering medical service—and all of them were medical practitioners—admitted that there was a problem, and one that needed serious consideration and attention. And the names included in the Medical Advisory Committee of The American Foundation and those who responded to the questionnaire are certainly representative of all classes of medical practitioners and medical health service.

While the Foundation does not offer any solution of the problem, it does offer abundant evidence and argument to justify the effort of the present political administration to do what they evidently want to do and intend to do—establish an agency of the Federal Government that will take upon itself the obligation of making adequate health service available to all classes of the people.

The avowed purpose of The American Foundation when it undertook the survey now reported was a consideration and discussion of the extent of service that the Government owes to its citizens, and it is quite apparent that they have convinced themselves that health service should be included in that service.

Throughout all this agitation, the dental profession has appar-

*"American Medicine: Expert Testimony Out of Court," Vols. I and II. By The American Foundation, 565 Fifth Ave., New York. Price $3.50.

ently been content to stand by and follow the lead of the medical profession. However, from the beginning, the writer has not been in accord with that policy. We do not believe that much is to be gained by blindly opposing any suggestion of change, but rather should we assume an attitude of cooperation with the governmental authorities, in the hope that we may be able to consultatively influence and direct the changes that will be made in the character and method of rendering medical and dental service in the future. Some such changes, we believe, are inevitable, and the sooner we become reconciled to that eventuality and endeavor to help determine the course and character of the changes, the better it will be for all concerned.

It seems, however, that there appears on the horizon, at the present moment, some hope or prospect of the organized medical profession modifying somewhat its attitude. At the recent meeting of the American Medical Association at Atlantic City, the House of Delegates passed a resolution expressing their willingness to cooperate with the governmental agencies toward the solution of the present social problem of health for all classes, and this we believe to be the wiser course.

Let it not be understood that we hold any brief for state, insurance or so-called panel dentistry, but we do believe we are facing a definite health problem, and we do believe that the soundest policy is one of sympathetic cooperation with the government agencies in the hope that we may help to determine the course that will be best.

Such a policy has been adopted by President Miner, and he reports a most receptive attitude on the part of the governmental department under whose direction the changes, if any, will be made.

It may be presumed, from the course which the dental profession has pursued, that we are not so opposed as the medical profession to any change in the present methods of rendering health service, and we believe such, in the main, to be the case. It is possible that such a modified attitude of mind may be due to the fact that dentistry suffered more from the depression than any other profession. Or is it because the dental mind is more sympathetic with the evolutional forces which have for ages been directing the development of the lay mind to a broader conception of the obligations of the healing professions to humanity? L. P. A.

ASSOCIATION ACTIVITIES

THE NATIONAL BOARD OF DENTAL EXAMINERS

AN OUTLINE OF PROCEDURES

By MORTON J. LOEB, D.D.S., Secretary, New Haven, Conn.

FOR nearly twenty-five years the dental profession has been discussing the matter of reciprocity in state board examinations. This discussion has taken place in various component societies of organized dentistry and in the journals. In all the efforts, there was expressed great favor toward some method whereby a practitioner of merit in one state might locate in another without the usual difficulty of passing examinations.

The problem never caused too much concern with regard to the so-called practical examination; it was the "theoretical" subjects which practitioners found too difficult, if for economic, health or social reasons one felt obliged to find a new habitat.

Two decades have passed since the first concerted action was taken, but the desired result really arrived in 1928, when the National Board of Dental Examiners was created by an amendment to the Administrative By-Laws of the American Dental Association, at its meeting in Minneapolis, Minn. In this action, the National Association of Dental Examiners and the American Association of Dental Schools had concurred, each one previously by a unanimous vote. The Board became a standing committee of the American Dental Association by the action of the House of Delegates.

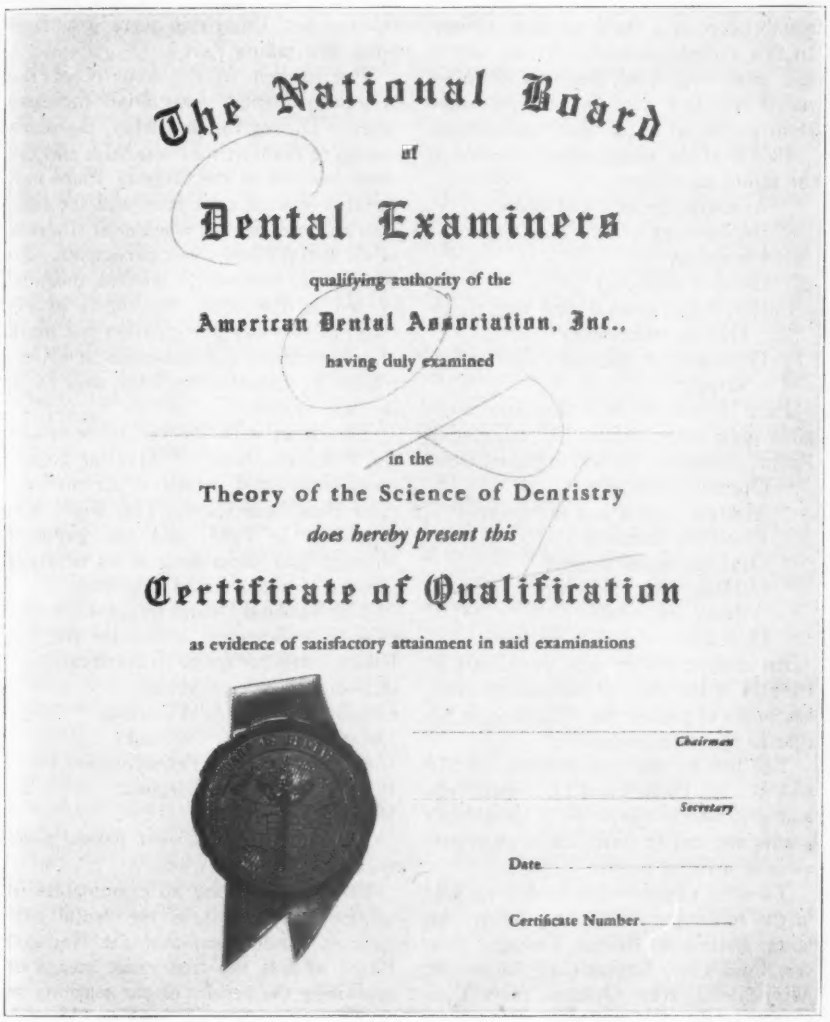
The membership is made up of five members each from the A.D.A., the N.A.D.E. and the A.A.D.S., In addition the Surgeons General of the Army and the Navy, and the Public Health Service are ex-officio members.

The National Board issues a Certificate of Qualification to those candidates who successfully pass Part I and Part II of the examinations. It does not issue a license, and never intends to do this. It conducts a standard examination on a high plane in the fundamental sciences, as well as in the specialized dental sciences. The results of the examinations are available for the various state boards, and these may be accepted in lieu of their own theoretical examinations. The National Board has no control, nor does it desire to have any control over the actions of any board, and those states which affiliate are the arbiters in every single instance as to whether to accept or reject a candidate. A candidate with a certificate making application to a state is subject to the requirements of the laws of that state.

The examinations are held in various cities throughout the country where there are five or more applicants. They are under the supervision of prominent practitioners, and the rules for the conduct of examinations in the various centers are the same.

The examination questions, which are prepared by recognized authorities, are

handed to the candidates from a sealed envelope opened in the presence of the candidates. At the close, the examination books are collected and returned to the secretary's office, from there to be sent to other authorities for grading. A candidate must obtain an average of 75 per cent, with no single grade below 65 per cent, in order to pass.


The National Board
of
Dental Examiners
qualifying authority of the
American Dental Association, Inc.,
having duly examined
in the
Theory of the Science of Dentistry
does hereby present this
Certificate of Qualification
as evidence of satisfactory attainment in said examinations
Chairman
Secretary
Date
Certificate Number

Certificate of Qualification of The National Board of Dental Examiners.

The same examinations are placed be-

fore graduate candidates as undergraduate, but in the former instance the board requires evidence of moral fitness and membership in a local or state society. In this manner, practitioners not identified with organized dentistry (the so-called transient dentists) are prevented from participating in the examinations.

Part I of the examinations consists of the following subjects:

Anatomy, general and dental
Bacteriology
Physiology
General pathology
Histology, general and dental, including embryology
Physiological chemistry and metallurgy.

Part II, for which a candidate is eligible only after successfully completing Part I, consists of the following subjects:

Operative dentistry
Materia medica and therapeutics
Prosthetic dentistry
Oral and dental surgery
Orthodontia, radiology, jurisprudence and ethics
Oral pathology and anesthesia.

An undergraduate may participate in Part II if the dean of his college certifies to his eligibility for a diploma at the time of the examinations.

The fees for the examinations are $10 and $15 for Parts I and II, respectively, and photostatic copies of a candidate's grades are sent to state boards upon payment of a fee of $1.00.

To date, examinations have been held in the following cities: Ann Arbor, Atlanta, Baltimore, Boston, Chicago, Denver, Iowa City, Kansas City, Louisville, Minneapolis, New Orleans, New York City, Omaha, Philadelphia, Pittsburgh, Richmond, St. Louis, and Washington, D. C., and students from more than half the dental colleges have participated. The total number of candidates has been well over six hundred, of which slightly more than two hundred have completed the two parts successfully. Of this successful number, thirty-two were graduates when first taking Part I.

The interest in this activity of the American Dental Association increases yearly. During the past May, the ninth session of examinations was held, and the class was one of the largest. Plans call for two sessions each year, and the time does not seem distant when most students in all dental schools will participate. To be eligible, however, a student must be graded in the upper two-thirds of his class; in this way participation is a mark of achievement, and possession of a Certificate of Qualification may well cause its owner pride.

This is so with the certificate which the National Board of Medical Examiners issues, and which is accepted by more than forty states. This board was organized in 1914, and has gathered strength and importance in its nearly a quarter of a century of existence.

The National Dental Board is likewise gaining in influence, and today the following states recognize its certificate:

Alabama	Maine
Connecticut	Minnesota
Delaware	Nebraska
Indiana	Pennsylvania
Iowa	Virginia
Illinois	

No doubt before the year passes, more will be added to this list.

Besides conducting an examination of contemporary merit in the dental subjects, it would seem that the National Board affords the first exact means of appraising the results of the teaching in the various schools. If nothing else, this board is offering the profession the answer to one of its most important interests—that of dental education.

66 Trumbull Street.

COMMITTEE ON LEGISLATION

THE following tabulations arranged and presented by the Committee on Legislation, graphically illustrate the nation-wide progress of dental law enactment for control of dental quackery. These tables should be studied by comparison, with careful notation as to the dates of compilation. States which have strengthened their dental laws by adoption of these provisions have done so for the best interests of public health and welfare. This has been definitely accentuated by that clear-cut decision by the Supreme Court of the United States, on April 1, 1935: "The community is concerned with the maintenance of professional standards which will insure not only competency in individual practitioners but protection against those who would prey upon a public peculiarly susceptible to imposition through alluring promises of physical relief . . . and the community is concerned in providing safeguards not only against deception, but against practices which would tend to demoralize the profession by forcing its members into an unseemly rivalry which would enlarge the opportunities of the least scrupulous."

A great change in dental law as relates to improper and unprofessional solicitation has come about during the last four and one-half years; it demonstrates the value of intensive cooperative effort on the part of the dental societies with other groups similarly interested in the welfare of the public and reflects the attitude of the public and the legislatures as no longer tolerant of questionable methods of practice.

The old type of dental legislation, hastily drawn on limited facts and experience, offered many loopholes that gave legal protection to the unskilled and the unscrupulous practitioner, who, while few in number, could be a very definite menace to society and the profession. This has given way to the more carefully thought out dental law based upon precedent and court decision. The former was, in a measure, empirical; the latter, more rational and evolved after careful consideration.

It is interesting to note that, of the forty-eight (48) states, the District of Columbia and Hawaii, four (4) states amended their dental laws in 1933, three (3) in 1934, twenty-seven (27) in 1935, five (5) in 1936 and eleven (11) in 1937, leaving only five (5) states which have not amended their dental laws since January 1933. This statement appears to be incorrect, but some of the laws which were amended in 1933, 1934 and 1935 were subsequently re-amended. This explains the apparent over-statement.

A. B. PATTERSON, *Chairman,*
Committee on Legislation,
American Dental Association.

TABULATION OF STATE DENTAL LAWS AS OF JANUARY 1, 1933
PERTAINING TO CERTAIN UNPROFESSIONAL PRACTICES

STATE	YEAR	SECTION	C S	F F	D F	P S	F P	D S	E S	F S	G W	P D
Ala.	27	o	o	o	o	o	o	o	o	o	o	o
Ariz.	21	4761	o	o	x	o	o	o	o	o	o	o
Ark.	21	24	o	o	o	x	o	o	o	o	o	x
Calif.	27	13	x	x	o	o	o	o	o	o	o	o
Colo.	19	o	o	o	o	o	o	o	o	o	o	o
Conn.	27	10	o	o	x	o	o	o	o	o	o	o
Del.	17	7	o	o	x	o	o	o	o	o	o	x
D. of C.	24	16	o	o	x	o	o	o	o	o	o	o
Fla.	26	18	o	o	x	x	o	o	o	o	o	o
Ga.	21	o	o	o	o	o	o	o	o	o	o	o
Idaho	27	2130	o	o	x	o	o	o	o	o	o	o
Ill.	29	o	o	o	o	o	o	o	o	o	o	o
Ind.	17	o	o	o	o	o	o	o	o	o	o	o
Iowa	27	53	x	o	x	o	o	o	o	o	o	o
Kan.	25	o	o	o	o	o	o	o	o	o	o	o
Ky.	12	6	o	o	x	o	o	o	o	o	o	x
La.	28	o	o	o	o	o	o	o	o	o	o	o
Maine	29	o	o	o	o	o	o	o	o	o	o	o
Md.	20	o	o	o	o	o	o	o	o	o	o	o
Mass.	27	o	o	o	o	o	o	o	o	o	o	o
Mich.	29	9	x	x	x	x	o	o	o	o	o	x
Minn.	27	o	o	o	o	o	o	o	o	o	o	o
Miss.	28	28	o	o	x	x	o	o	o	o	o	x
Mo.	29	13566	o	o	x	o	o	o	o	o	o	x
Mont.	09	o	o	o	o	o	o	o	o	o	o	o
Nebr.	27	47	x	o	x	o	o	o	o	o	o	o
Nev.	19	4	o	x	x	o	o	o	o	o	o	o
N. H.	19	7	o	x	x	o	o	o	o	o	o	x
N. J.	24	7	o	o	x	o	o	o	o	o	o	o
N. M.	15	6	o	o	x	o	o	o	o	o	o	o
N. Y.	28	1313	o	o	o	o	o	o	o	o	o	o
N. C.	15	22	o	o	x	o	o	o	o	o	o	o
N. D.		4	o	x	o	o	o	o	o	o	o	o
Ohio	21	1325	o	o	x	o	o	o	o	o	o	o
Okla.	19	13	o	o	x	x	o	o	o	o	o	x
Ore.	21	8573	x	x	x	o	o	o	o	o	o	o
Pa.	21	7	o	o	x	x	o	o	o	o	o	o
R. I.	18	o	o	o	o	o	o	o	o	o	o	o
S. C.	22	18	o	o	x	o	x	o	o	o	x	o
S. D.	21	4	x	x	x	o	o	o	o	o	o	o
Tenn.	19	7	o	o	x	o	o	o	o	o	o	x
Tex.	19	10	o	o	x	o	o	o	o	o	o	o
Utah		2032–34	x	x	x	o	o	o	o	o	o	o
Vt.	21	o	o	o	o	o	o	o	o	o	o	o
Va.	28	1649	o	o	x	x	o	o	o	o	o	o
Wash.	23	21	o	o	x	o	o	o	o	o	o	o
W. Va.	15	6	o	o	x	o	o	o	o	o	o	x
Wis.	23	152.06	x	x	x	x	o	o	o	o	o	o
Wyo.	24	o	o	o	o	o	o	o	o	o	o	o
Hawaii	25	4	o	o	x	x	o	o	o	o	o	o
Totals	1933	(January)	8	9	31	9	1	o	o	o	1	10

o—no provision; x—now in effect, and prohibits; C S—employing cappers and steerers; F F—fraudulent fee; D F—deceit and fraud; P S—claim of professional superiority;

(Continued on opposite page)

TABULATION OF STATE DENTAL LAWS AS OF JUNE 2, 1937
PERTAINING TO CERTAIN UNPROFESSIONAL PRACTICES

STATE	YEAR	SECTION	C S	F F	D F	P S	F P	D S	E S	F S	G W	P D
Ala.	35	333	x	x	x	x	x	x	x	x	x	x
Ariz.	35	20	o	o	x	o	o	o	x	o	o	x
Ark.	37	24	o	o	o	x	x	x	x	x	x	x
Calif.	35	13 (3)	x	x	x	x	x	x	x	x	x	x
Colo.	35	10	x	o	x	x	x	x	x	x	o	x
Conn.	35	2807	o	o	x	x	x	x	o	o	o	o
Del.	35	22	x	x	x	x	x	x	x	o	x	x
D. of C.	24	16	o	o	[illegible]	o	o	o	o	o	o	o
Fla.	35	18	o	x	x	x	o	o	o	o	o	o
Ga.	37	13 (3)	x	x	x	x	x	x	x	x	x	x
Idaho	35	53-1314	x	o	x	x	x	x	o	x	x	x
Ill.	35	18B	x	x	x	x	x	x	x	x	x	x
Ind.	35	7-A	x	o	x	x	x	x	x	x	x	x
Iowa	35	2573-G16	x	x	x	x	x	x	x	x	x	x
Kan.	37	Yes	x	x	x	x	x	x	o	x	o	x
Ky.	36	7 (3)	x	x	x	x	x	x	x	x	x	x
La.	36	9517	x	x	x	x	x	x	x	x	x	x
Maine	35	34	o	x	x	x	x	x	o	o	o	x
Md.	37	8	x	x	x	x	x	x	x	o	o	x
Mass.	35	52-A	o	o	x	x	x	x	o	o	o	x
Mich.	29	9-4	x	x	x	x	o	o	o	o	o	x
Minn.	35	6	x	x	x	x	x	x	x	x	o	x
Miss.	36	28	o	o	x	x	x	x	x	x	x	x
Mo.	37	13566	x	x	x	x	x	x	x	x	x	x
Mont.	35	13	x	x	x	x	x	x	x	x	x	x
Nebr.	35	71-602	x	x	x	x	x	x	x	x	x	x
Nev.	19	4	o	x	x	o	o	o	o	o	o	o
N. H.	19	7	o	x	x	x	x	x	o	o	o	x
N. J.	34	7-G	o	o	x	x	x	x	x	x	x	x
N. M.	15	37-106	o	o	x	o	o	o	o	o	o	o
N. Y.	35	1313	x	x	x	x	x	x	x	x	x	x
N. C.	35	14	o	o	x	x	o	o	x	o	o	o
N. D.	37	510	x	x	x	x	x	x	x	x	x	x
Ohio	35	1325	x	o	x	x	x	x	x	x	x	x
Okla.	35	29	o	o	x	o	o	o	o	o	o	o
Ore.	33	68-1013	x	x	x	x	x	x	x	x	x	x
Pa.	37	3 (i)	o	o	x	x	x	x	x	x	x	x
R. I.	35	18	x	x	x	x	x	x	x	o	o	x
S. C.	36	18-4	x	x	x	x	x	x	x	x	x	x
S. D.	37	8	x	x	x	x	x	x	x	x	x	x
Tenn.	35	8	x	x	x	x	x	x	x	x	x	x
Tex.	35	4549A	o	o	x	x	x	o	x	x	o	x
Utah	35	79-6-8	x	x	x	x	x	x	x	o	o	o
Vt.	37	7512	x	x	x	x	x	x	x	x	x	x
Va.	35	1649	o	o	x	x	x	x	x	x	x	x
Wash.	35	20	x	o	x	x	x	o	o	o	o	o
W. Va.	37	7	x	x	x	x	x	x	x	o	x	x
Wis.	35	152.06	x	x	x	x	x	x	x	x	x	x
Wyo.	37	15	x	x	x	o	o	o	o	o	o	o
Hawaii	35	983-994	o	o	x	x	o	o	o	o	o	o
Totals	1937	(June)	32	31	49	44	40	38	35	30	28	39

F P—prohibiting fixed prices; D S—display sign; E S—employing solicitors; F S—"free" service; G W—"guarantee" work; and P D—claim of painless dentistry

A. D. A. GROUP INSURANCE

REPORT OF COMMITTEE

To All American Dental Association Group Certificate Holders:

While the American Dental Association Insurance Committee was elected to represent the entire membership, we are, in reality, your committee, and feel that you are entitled to a special report from us.

Our investigation, which began at the American Dental Association Session in New Orleans, included all plans and proposals from companies interested in group insurance, and we were assisted by insurance actuaries and experts chosen by our own committee members. Our findings were reported to the Board of Trustees at their recent meeting in Chicago and can be briefly summarized as follows:

(1) The financial responsibility of the Great-West Life Assurance Company is unquestioned.

(2) The service given our members and their beneficiaries by those handling the insurance has been excellent.

(3) The low cost of this type of insurance has been properly safeguarded by the plan of insurance which is found to be sound from an underwriting standpoint. With the addition of a new right of conversion to an individual policy by persons as they reach age fifty-one, which was secured through the instigation of the Insurance Committee, the one objection has been largely eliminated for those now insured and entirely eliminated for future insured, by allowing the permanent retention of the full $3,000 amount.

It is the opinion of the undersigned that all dividends paid to the American Dental Association (with the exception of incidental expenses such as investigation and protective action taken by the Committee of the A.D.A.) belong and should be paid directly to the policyholders to reduce their premiums. As the number of policyholders increase, we expect quite favorable dividends.

It is not possible for the American Dental Association to duplicate our present group insurance on a better basis than we now have. This finding by the committee is based on its lengthy and thorough investigation.

You need have no hesitancy in recommending the present plan to others.

American Dental Association
Insurance Committee.

A. D. Weakley, *Chairman*.
1029 Vermont Ave.,
Washington, D. C.

Fred A. Richmond, *Secretary*,
305 Federal Reserve Life Bldg.,
Kansas City, Kan.

U. G. Rickert,
726 S. State St.,
Ann Arbor, Mich.

H. E. Summers,
1015 First National Bank Bldg.,
Huntington, W. Va.

L. E. Nightengale,
48 East Orange St.,
Lancaster, Pa.

RESEARCH COMMISSION OF THE AMERICAN DENTAL ASSOCIATION

By P. C. LOWERY, D.D.S., Chairman, Detroit, Mich.

THE Research Commission is gratified over the interest manifested by the dental profession and the dental trade in the lists of certified products which are now regularly appearing in THE JOURNAL. On page 808 of the May 1937 issue, the following paragraph, which explains the Research Commission's position, heads the list of inlay casting golds:

Samples of all inlay casting-gold alloys certified to the Research Commission of the American Dental Association by the various manufacturers were procured on the open market by the Research Commission and tested by the American Dental Association Research Associates at the National Bureau of Standards. As of February 15, 1937, the following list of casting gold alloys was found to comply with American Dental Association Specification No. 5. Alloys which did not comply are omitted from the list.

The Research Commission has received a complaint that this paragraph is ambiguous and unfair to a certain manufacturer. As the Commission does not wish to embarrass any manufacturer by having the dental profession or the dental trade misconstrue any of its statements, it is calling attention to the fact that the word "certified" indicates only those materials which have been certified to the Research Commission by the manufacturers. Some manufacturers do not certify their materials to the Commission, but instead independently guarantee them to comply with various specifications. Hence, they are not tested by the Commission. Now there is a distinct difference between (1) formal certification of a manufacturer's product to the Research Commission by the manufacturer and (2) an independent guarantee by the manufacturer, without the formal certification which the Research Commission demands.

The program with which a manufacturer must comply before his product can appear on the list of certified products published by the Research Commission in THE JOURNAL is as follows:

1. The manufacturer must sign a formal certificate stating that his material complies with requirements of the A.D.A. Specification.

2. The manufacturer must submit to the Research Commission certain data and proof that he has his own testing equipment and personnel, or is having his testing carried on in a laboratory which the Research Commission believes to be reliable.

3. The Research Commission then procures his product on the open retail market by means of a requisition blank and directs their research associates at the National Bureau of Standards to test the product so procured. If the material is found to comply with the A.D.A. Specification, the Research Commission enters it on the list of certified products. Any materials that do not comply are not eligible for the list. From time to time, samples of the certified materials are procured and tested. Any of these certified materials which do not comply are omitted from the list.

Several manufacturers choose not to assist the Research Commission in its program, but instead independently guarantee their products to comply with the

Specification. There is no logical basis for such a procedure on the part of a manufacturer, since, if he is already testing his product, he is not put to any additional expense by certifying his material to the Research Commission. The Commission makes no charge of any kind to any manufacturer for certifying his product.

This method of testing and listing certified materials gives the profession a list of materials which have been tested by its own representatives. In the maze of high pressure advertising, this program gives the Research Commission a much needed control over the situation. The Research Commission is certain that the profession appreciates the significance of this program and that it is using the list as a guide in purchasing materials of known quality.

Certified Dental Mercuries A.D.A. Specification No. 6*

Samples of all dental mercury certified to the Research Commission of the American Dental Association by the various manufacturers were procured in the open market by the Research Commission and tested by the A.D.A. Research Associates at the National Bureau of Standards. As of April 20, 1937, the accompanying list of mercuries was found to comply with American Dental Association specifications. Mercury which did not comply is omitted from this list.

Lists of tested certified dental materials will be published from time to time in The Journal. All of our specifications are formulated with one thought in mind. quality. By using the materials on these revised lists you are assured of obtaining products scientifically suited for their specific use in dentistry.

Second Survey of Mercury
(February 2, 1937)

Mercury	Manufacturer or Distributor
Argentum	Hammond Dental Mfg. Co.
Chemically Pure	The S. S. White Dental Mfg. Co.
Dee	Thomas J. Dee & Co.
Dental	Goldsmith Bros. S. & R. Co.
Mercury Laboratories	Mercury Laboratories, Inc.
Minimax	The Minimax Co.
Mission	San Diego Smelting & Refining Co.
Mynol	Mynol Chemical Co.
Ney's C. P.	The J. M. Ney Co.
Odontographic	Odontographic Mfg. Co.
Positively Pure	Garhart Dental Specialty Co.
R. P. C.	Research Products Corporation
Spectropure	Baker & Co., Inc.
Twentieth Century	The L. D. Caulk Co.

*Isaacs, Aaron: "Mercury for Dental Amalgams." J.A.D.A., 19:54, January 1932.

BUREAU OF PUBLIC RELATIONS

DENTAL HEALTH EDUCATION IN MALDEN, MASS.

By C. E. TURNER, Boston, Mass., and F. G. MARSHALL and ADELAIDE R. ROSS, Malden, Mass.

SHOULD school dental service begin with the examination of the teeth of all children and the recording of defects, or should we begin with health education looking toward treatment by the family dentist? In the choice between a general dental examination at school and the direct application of health education to secure dental care, the latter is, we believe, clearly the more desirable. Practising dentists and teachers and parents form the first line of defense for the dental health of the great majority of American school children. The indigent child needs free clinical service, of course, and the assistance of the school nurse to help him get such service; but the majority of children can be cared for by the teacher-parent-dentist program.

The dental health education plan operates as follows: Dentists are supplied with blank certificates available from the state department of public health, indicating that all needed dental work has been completed. Each classroom tries for a record of 100 per cent in securing dental certificates before the end of the school year. Various educational devices are used to add interest in this activity. Children, through their parents, make appointments with the family dentist, who examines the teeth, does the necessary work and fills out the certificate, which is brought back to the school and posted in the classroom. The child receives recognition by his classmates when he brings back his dental certificate. The certificates are posted, and the class progress is recorded. Nurses render invaluable aid in taking needy children to free clinics.

An important element in this plan is the dental survey. Each year, the director of health education collects data showing the percentage of dental certificates secured by each class. (There is also an inspection and report on the cleanliness of the teeth of pupils.) These data are tabulated and each school receives the figures for the system as a whole and its own data, but not the data for other individual schools. The only comparison given each school is that with its record of the previous year.

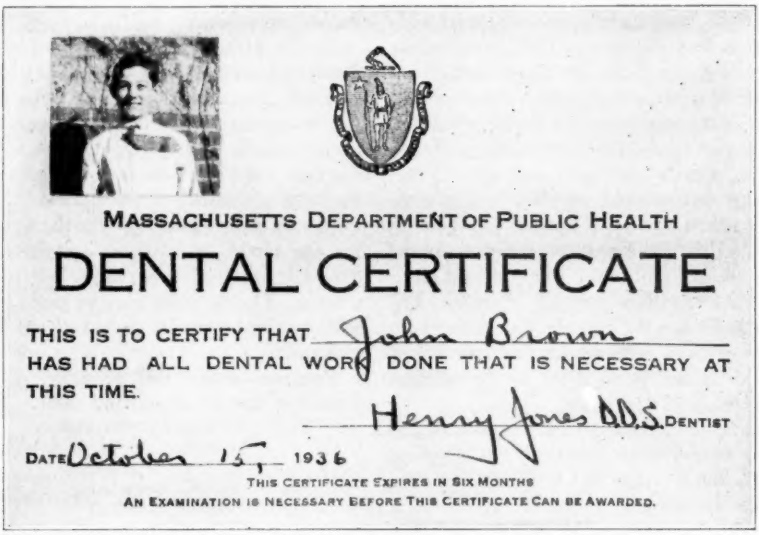
Progress under this program is reflected in the accompanying table.

DATA ON DENTAL CONDITIONS IN MALDEN SCHOOLS

Year	Children Completing Dental Treatment Per Cent	No. of 100% Classes
1927*	30*	—
1928*	37*	—
1929	39	0
1930	45	3
1931	60	9
1932	63	7
1933	58	6
1934	62	8
1935	65	24
1936	69	16

*Dental certificates were not required of all children. Those with no obvious defects, as judged by the school nurse, were included in the numbers.

The amount of free clinic service available has not been increased. Comparative figures for 178 towns in Massachusetts show that, in 1931, about 18 per cent of the school children received complete corrective treatment, and, at the present time, about 30 per cent of the Massachusetts children in towns where dental certificates are in use receive such treatment. In the state as a whole in 1931, about 50 per cent of the children receiving treatment were treated in free clinics. In Malden, only 25 per cent received treatment in free clinics. The increase in the percentage of treatments in Malden without added free clinic service clearly shows that education has been the dominating force.



MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

DENTAL CERTIFICATE

THIS IS TO CERTIFY THAT John Brown
HAS HAD ALL DENTAL WORK DONE THAT IS NECESSARY AT THIS TIME.

Henry Jones D.D.S. DENTIST

DATE October 15, 1936

THIS CERTIFICATE EXPIRES IN SIX MONTHS
AN EXAMINATION IS NECESSARY BEFORE THIS CERTIFICATE CAN BE AWARDED.

Certificate, furnished dentist by state department of health, which is presented to the child on completion of his dental work. All such certificates are posted in the school room, forming a basis for recording the class progress in dental health.

The school program with a dental service approach seeks first to examine all children to discover dental defects. Authorities agree that this examination should be made by a dentist as no one else can be expected to discover the minor but important defects. Records must be made. When this work has been done at considerable cost, there is as yet no improvement in dental health. Then the nurse begins a follow-up to get all children to the dentist. Commonly, the percentage of corrections is far below that reported here.

A dental health education program has a definite philosophy behind it. Education strengthens a people, and too much free service tends to weaken them. The child who is cared for in the grades is likely to assume little active responsibility for remedial treatments later. Every child should go to his family dentist. Certainly no school examiner except a dentist would be warranted in telling a child that no dental attention is needed. In the dental health education program, the cost of ex-

amination and recording is saved. Teachers are in a strategic position to secure the dental visit. In the classroom, there is the force of public opinion, and the campaign of a class to secure a perfect record in the correction of dental defects is unsurpassed as a motivating force for the child. Examinations, unless they lead to remedial treatment, are of no avail. In the office of the private dentist, examination and treatment come together.

From our successful experience, we believe that the ideal school dental program includes:

1. An organized and supervised program in general health education in which dental health education plays an important part, with continued training and instruction in protective diet and oral hygiene.

2. The use of the dental certificate and survey plan in an attempt to get all children to the dentist at least once in each school year. (This is a practical standard from the standpoint of school administration, although we bear in mind the ideal standard of two visits a year for those children who can attain to it.)

3. The substitution of this plan under proper educational leadership for general dental examinations at the school.

4. Necessary clinical services for needy children as passed upon by the school nurse.

5. The invaluable services of school nurses throughout the year to secure clinic treatment for needy children and additional service from the clinics in the latter part of the year to follow up those children who have not yet been to the dentist.

6. A unified dental profession whose members not only will render high quality service to children in all cases, but also will refuse to sign certificates until the needed work really has been done, and who will support the educational program, particularly as to the importance of regular dental attention.

7. The maintenance of contact with the dental profession (1) to establish the standards indicated by the dental certificates, (2) to promote mutual understanding and cooperation and (3) to record progress from year to year.

DENTAL HEALTH PROGRAM, CHICAGO, ILL.

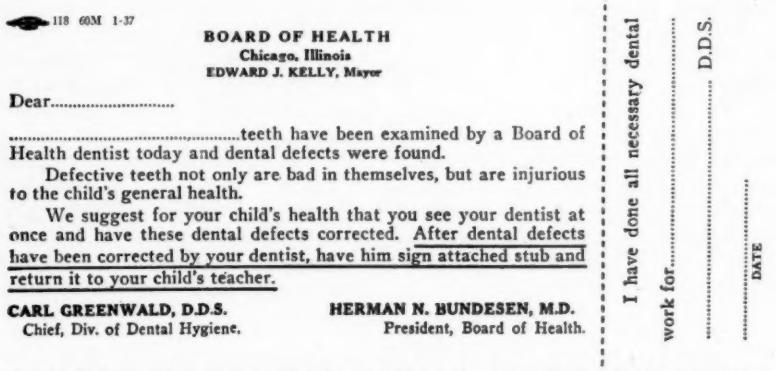
By CARL GREENWALD, D.D.S., Chicago, Ill.

OF interest to the members of the dental profession, and to all others interested in promoting better care of the teeth of the Chicago school children, is a plan recently launched by the Board of Health of the City of Chicago. This new plan, under Herman N. Bundesen, president of the Chicago Board of Health, and directed by the chief of the Division of Dental Hygiene, offers an effective means of persuading parents of school children to take them to their dentists to have the necessary work done on their teeth. The program of getting the children to the dentist and being assured that the necessary work actually will be done is a part of the examining activities regularly conducted in the schools by the Division of Dental Hygiene of the Chicago Board of Health.

Under the new program, when a board of health dentist examines a pupil and

(From the Division of Dental Hygiene, Chicago Board of Health.)

discovers carious teeth, the child is given a printed card. (Fig. 1.) Attached to this card, as shown in Figure 1, is a perforated section, which is filled out by the dentist and which states that the work has been done. The child is instructed to return this section bearing the dentist's signature to the teacher. The school teacher in turn delivers the statement to the board of health nurse. On receiving the dentist's statement that the necessary dental work has been done, the nurse delivers to the child a board of health engraved certificate, very colorful, bearing a gold seal and suitable for framing,



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BOARD OF HEALTH
Chicago, Illinois
EDWARD J. KELLY, Mayor

Dear.....

.....teeth have been examined by a Board of Health dentist today and dental defects were found.

Defective teeth not only are bad in themselves, but are injurious to the child's general health.

We suggest for your child's health that you see your dentist at once and have these dental defects corrected. After dental defects have been corrected by your dentist, have him sign attached stub and return it to your child's teacher.

CARL GREENWALD, D.D.S.
Chief, Div. of Dental Hygiene.

HERMAN N. BUNDESEN, M.D.
President, Board of Health.

I have done all necessary dental work for.....D.D.S.

DATE.....

Fig. 1.—Card used to inform parents that child's teeth have been examined and defects found, with stub attached for certification by dentist that necessary work has been done.

which declares that the child possesses teeth that are in a clean and healthy condition. (Fig. 2.)

The first results of this method have convinced Dr. Bundesen of the effectiveness of this plan to improve the teeth of the children of Chicago. The pupils look on this certificate of dental health as something desirable, and the fact that the pupils are requested to bring back from their dentist a statement that the work has been done has proved an added inducement to the children to actually visit their dentist.

At the present time, the board of health employs twenty-eight full-time dentists and operates eighteen full-time dental clinics. In each clinic, assisting the dentist, are girls trained to act in the capacity of assistant to the dentist. These assistants are secured from the Works Progress Administration. Because of the assistance thus given him, the dentist can take care of many more indigent children.

It is obvious that it is impossible for twenty-eight dentists to care for several hundred thousand school children. Heretofore, the Dental Division of the Chicago Board of Health has had dentists making examinations in the various schools. All school children of the city do not have a dental examination, because it is impossible to cover the entire city with the present personnel. Therefore, it was decided to examine the teeth of every child in the kindergarten and the first grade. This will mean that approximately 75,000 children will be examined each year, examination to be followed by an adequate check-up through the offices of the various health chairmen of the parent-teacher associations. All these children will be referred to their own family

dentist for the necessary corrections, and those children who are unable to secure dental work from the dentist because the family is indigent will be sent to the board of health clinic for the necessary dental work. Under this new plan, when a child in the kindergarten or the first grade is examined by the board of health dentist and dental defects are discovered, he will be given a dental card. (Fig. 1.) The child is instructed to return the perforated section to his teacher after it is filled out by the dentist. The teacher in turn will deliver the statement to the school principal, who will send it to the board of health.

As a reward to the child, and to further urge him to take advantage of this dental program, each class will be presented with an honor roll, and when the child returns the dental examination card, a gold star will be placed opposite his name. Experience proves that this will do much to interest the child in this activity. As a still further reward, if the child's dental defects have been corrected, the board of health will issue to him an engraved certificate of merit (Fig. 2) on receipt of the dentist's statement that the dental work has been completed.

There is no doubt that many of the parents will not be able to send the child to the dentist because of their financial condition. Consequently, children in kindergarten and the first grade will be sent to eighteen dental clinics, located throughout the city and operated by the board of health. In this plan, it will be our aim, first, to send all of the children to their own family dentist, if possible, and, if not, to send the children in kindergarten and the first grade to the board of health dental clinics, where any necessary dental work will be done.

With the completion of the program, some time this fall, all children in the

BOARD OF HEALTH
CITY OF CHICAGO
EDWARD J. KELLY, MAYOR

This is to Certify that _____

has been examined by a Dentist of the Chicago Board of Health

and _____ *Teeth and Mouth are Declared to be in a Clean and*

Healthy Condition _____ DATE

Carl Greenwald D.D.S. *Truman W. Bundesen* M.D.

CHIEF, DIVISION OF DENTAL HYGIENE — PRESIDENT OF BOARD OF HEALTH

I WILL

Fig. 2.—Certificate given child by board of health on completion of dental work needed.

kindergarten and first grade of the Chicago schools will have teeth that are free from dental defects. This program will, no doubt, create an interest in tooth health in these children. After this plan has been in operation for eight years, every child in the Chicago elementary schools will have had a dental examination, with all defects corrected during the child's first year in school. This will unquestionably result in the children of the Chicago elementary schools having better teeth and, consequently, stronger and healthier bodies. At the present time, about 96 per cent of the children have defective teeth. After this program has been in operation for eight years, it can readily be seen, dental decay will be reduced to a minimum.

OKLAHOMA CITY CHILDREN'S DENTAL PROGRAM

THE Board of Education of Oklahoma City employs one full-time dentist, who examines the children's teeth, notifies the parents of defects found and urges correction. Part of his time is spent in dental educational work in the class room. Charts, posters, motion picture films and stereopticon slides are used for this purpose. The school dentist employs a modified version of the Iowa plan in an effort to motivate the children to go to their family dentist for correction.

Children from indigent families and those in the low wage group are referred to the Salvation Army Dental Dispensary for care. This dispensary was first started by the Oklahoma City Dental Society. During the first year, one full-time nurse was employed and each dentist in the county gave one half day's service per month, two dentists working in the morning and two in the afternoon. The success of this plan enabled the dental society to interest the officials of the Community Fund in the endeavor. The fund has increased the dental budget so that the dispensary now employs a full-time dentist and a nurse. The Salvation Army furnishes the space and renders all social service to the patients. One of the most important features of the Oklahoma City plan is that the dental society forms the board of control. All policies and procedures are formulated and supervised by the society.

ALABAMA STATE DENTAL DIVISION

THE Alabama State Board of Health reestablished the Division of Oral Hygiene, April 1, 1937, and Reuben T. Crawford, D.D.S., was appointed chief.

Educational work in oral hygiene is the principal purpose of the division. The aim of the program is to create a desire in the patient to have a clean mouth and to seek the services of the dentist for corrective measures before conditions become severe.

The program will be carried out with the cooperation of the dental associations, county health officers, county school superintendents and, especially, the individual school teachers. Educational workers in the Oral Hygiene Division will give class room instruction as well as talks before civic groups, parent-teacher associations and other organizations.

OREGON STATE DENTAL DIVISION

THE Oregon State Department of Public Health announces the inauguration of their new dental division. The new division, partially financed by Social Security funds, is headed by Floyd H. De Camp. Dr. De Camp is especially qualified for the position. His early training was secured in the dental department of the Cousins Fund

of Michigan, after which he conducted a survey for the U. S. Public Health Service in Louisiana. Recently he has been assistant to William R. Davis, dental director for the Michigan State Department of Public Health.

The Oregon State Dental Society and the Oregon State Board of Dental Examiners are working closely with the Oregon State Health Department in setting up their new program, which will be entirely of an educational nature.

A.D.A. RADIO BROADCASTS OVER COLUMBIA NORTHWEST AND SOUTHWEST CHAINS

THROUGH the cooperation of the Columbia Broadcasting System, the American Dental Association's weekly radio programs are being made available to the following stations, at 12:15 p.m., Central Standard Time.

*KNOW—Austin, Texas
*KRLD—Dallas, Texas
*KTRH—Houston, Texas
KLRA—Little Rock, Ark.
*KOMA—Oklahoma City, Okla.
*KTSA—San Antonio, Texas
*KWKH—Shreveport, La.
*KTUL—Tulsa, Okla.
*WACO—Waco, Texas
KGKO—Wichita Falls, Texas
*KFH—Wichita, Kans.
WIBW—Topeka, Kans.
WOC—Davenport, Iowa
WCCO—Minneapolis, Minn.
WNAX—Yankton, S. D.
KSCJ—Sioux City, Iowa
KFAB—Omaha, Nebr.
WTAQ—Green Bay, Wis.
WISN—Milwaukee, Wis.
WMBD—Peoria, Ill.
*KRNT—Des Moines, Iowa
WKBB—Dubuque, Iowa

*These stations are now using our programs.

SUBJECTS AND DATES FOR THE COMING MONTH

July 6: The Discovery of Ether
July 13: Local Anesthesia
July 20: Cancer of the Mouth
July 27: Discovery and Use of X-Rays

DRAMAS OF DENTISTRY

THREE dramatized dental radio programs will be presented over the Columbia Network by the University Broadcasting Council of Chicago, on Monday, Tuesday and Wednesday, July 12th, 13th and 14th, at 4:15 to 4:30 p.m., Eastern Daylight-Saving Time.

Prepared especially for the Atlantic City Meeting.

Don't Miss Them!

DENTAL ECONOMICS

A QUARTER CENTURY OF DENTAL PRACTICE

By J. H. KOLTER, D.D.S., Wausau, Wis.

THE human mind can perform miracles; in the wink of an eye, it can transport one across the continent or carry one back into past ages with all the vividness of reality. So, with your indulgence, I shall cultivate a reflective mood and review briefly a quarter century of dental practice. I have no disposition to recite an array of "way-back-when" events. I shall refer to the past and the present only as a basis for a cast into the future. And I trust that among the chaff there may be found a few kernels of truth, the observation of which may prove of value, particularly to the younger practitioner.

Pardon the use of the first personal pronoun. I cannot well avoid it, but it does not indicate egotism, for I am very humble, happy in the thought that I have been privileged to practice so long, establish a home and provide for loved ones.

Times have changed in a quarter century. We eat strawberries while the snow drifts still hide the fertile soil and enjoy other delicacies out of season. We flit across the country by various modes of transportation and annihilate space. We enjoy the New York Philharmonic concert an hour before it is played, and thus annihilate time. We have made progress in every activity save one. To our shame be it said, we have not learned to live peaceably with our neighbors. With diabolical cunning, we have developed machines of destruction to wipe out communities in wholesale slaughter. But, in spite of wars, we have lengthened the span of life. (Fig. 1.) We have conquered pestilence and plagues. We have reduced infant mortality. We have developed comforts of living. It is but natural that we should have made progress in the practice of dentistry.

Let us consider a few of the obsolete practices. The dental display at the Century of Progress World's Fair drew the vivid picture, impressive not only to the dentist but to the layman as well. This is all educational, and education is what is needed most. No longer do we educate as did the "advertiser" of old with his display case and the liveried barker on the street. With the courts ably supporting recently enacted legislation, there is a pronounced waning of the fraudulent advertising that used to appear under the guise of education. Our new laws specifically prescribe the limitations in display ads. I presume it is progress; but in another quarter century, some of our present laws will, I believe, seem ridiculous. Witness the measurement of ethics by the square inch; what we really need is more of the spiritual influence of fine men.

Education is the watchword. Isn't it gratifying to note that the work being done in our schools is bearing fruit? In vain do we work on the older generation. They are well nigh hopeless. They will have to die off. The children are our fu-

(Read before the Wisconsin Central Dental Society, May 1936.)

ture clientele. They come to us with more confidence, with less fear. Their parents may still contend that the deciduous teeth are a nuisance, the sooner lost the better; that to care for them is merely playing a sort of gentlemen's "racket," while the practice of "prophylactic odontotomy" is daylight robbery. But the children, thanks to our school program, know better, even though they may not be able to give the reasons. And, as a still further mark of educational progress, young parents acknowledge the benefits of prenatal dietary reinforcement and are very anxious to see that the order "have your teeth out" when the teeth were artificial. While the importance of the teeth and masticatory organs is now being recognized in the human economy, in the past too little consideration has been given to their function. The physician simply lacked dental training and his literature was wofully lacking on this important subject. He did not think in dental terms, just as the dentist too often failed to think in medical terms.

But today there is an ever-growing meeting ground owing to education. Consultation between the two is the only fair

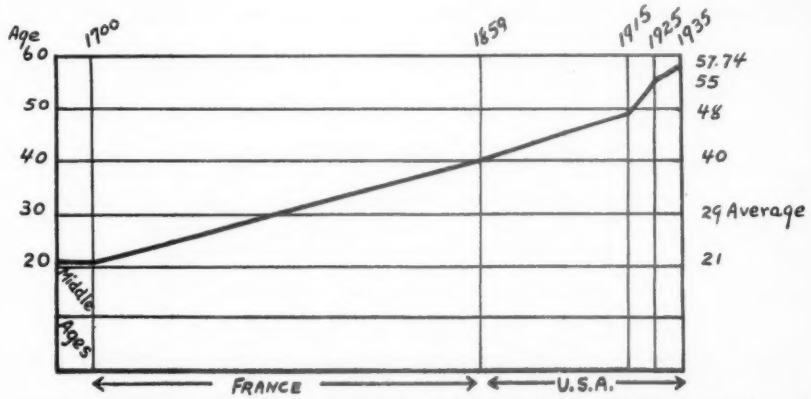

Fig. 1.—Chart showing life expectancy (compiled from statistics published in The Journal of the American Medical Association, July 20, 1935).

their children do not suffer from such neglect as they themselves may have experienced.

There is much of encouragement in the cooperation we receive from our medical brethren. True, there are instances, exceptions if you please, which are still quite incomprehensible. Occasionally, we still hear the peremptory order that a certain tooth "must be immediately extracted"; and this only on suspicion, without a careful diagnosis and without consultation. You have all heard means from the patient's standpoint. The physician justly acknowledges that the dentist, by peculiar training in that field, is competent to pronounce judgment in pathologic oral conditions; and the dentist does not presume to trespass on the domain of general medicine, but, in case he is the first to be consulted, gracefully and eagerly refers the patient to the physician. The two together can best serve the patient.

I sometimes fear we dentists have become overzealous as dietitians. When

we consider our utter helplessness in preventive treatment of dental caries, it isn't difficult to understand why we grasp at straws. Scientific research will establish certain facts and fallacies in future years. It is well that we are alert to work that is being done along these lines, but the physician is prone to scoff at our enthusiasm. Again I say that the interest of the patient will probably best be served if dentist and physician counsel together in any matter of mineral and vitamin therapy; for, after all, the objective of both is a health service, and, in the future, we dare hope that there will be complete and harmonious cooperation between the two.

As we browse through current magazines (and I do not refer to the stacks of trash that come to our desk), we find much of real merit and value; but there is much more unreal, untrue, positively false and misleading. This is the case in all fields: business, sociology, mechanics, science, medicine and not excepting dentistry. Verily, our journals are cluttered with trash, stuff that is unauthentic, pseudoscientific and valueless. Now, while I resent the serving of such an unwholesome repast, I dare not wholly discourage these young authors. Indeed, I wish to assume my share of the responsibility by conceding their privilege to write, but admitting also that I need not partake of every dish that is served. I can afford to be very discriminating in my choice of reading matter, for there is no law compelling me to spend my time on a subject in which I am not interested.

Many men there are who have devoted themselves assiduously to mechanical and scientific problems, and I honor them for their contributions. But we have all seen printed reports full of diagrams, charts, graphs, etc., that seem to have been prepared solely to satisfy the vanity of the author and that are positively not contributions, but merely a lot of chaff, soon fortunately blown from our memory by the gentle zephyrs of time.

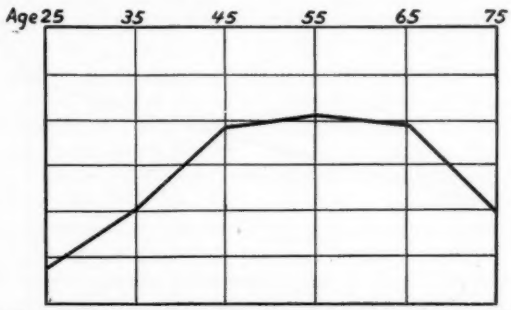

Fig. 2.—Financial standing of lawyer, ages twenty-five to seventy-five. (Figures 2 to 4 are based on Devney's economic table.)

We have many good dental journals. Our A.D.A. JOURNAL is unique; it should be in every dental office. There is none other like it, and as the spokesman for organized dentistry, it is positively indispensable. Other organs play in a different key. The staffs of editors in the main consist of eminent men and their articles can be perused with decided profit. Ostensibly, some are issued by interests who profit to a certain extent by the advertising material they carry. Let us grant them that privilege.

This introduces another subject, advertisements. It is said that any one who

reads the ads in a popular magazine, for example, *The Saturday Evening Post,* can note the progress of our times. It is true that dental advertisements are also very illuminating. Read a dental journal 25 years old. There were not so many of them in those days, but they are interesting. See the illustrations of the furniture, equipment, instruments and supplies. See some of the "funny stuff," pen and ink sketches, conversing characters with their striking stories. Ludicrous, you say? Yes, indeed. But even today we have cement bottles with faces and other grotesque absurdities. Verily, in another quarter century, the advertising of today will look funny enough. But I suppose these are greater heights. That is the March of Progress. And I presume that twenty-five years hence, some of our conservative, honest practices of today will have been completely discarded, superseded by better practices that will be of greater value to humanity. Time marches on.

A brief consideration of clinics and conventions should be of interest. Again I should be inclined to be resentful of those who waste my time with untried and unproven methods and theories. But I have the right of choice and I am 25 years more mature than I was when I started to practice. I hold it absolutely essential to be regular in attendances at clinic gatherings from the little to the big,

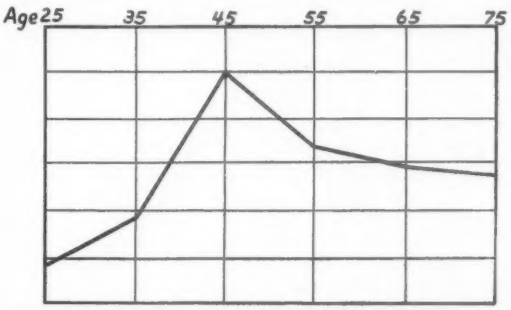

Fig. 3.—Financial standing of physician, ages twenty-five to seventy-five.

vogues (how I despise the term!), just as we have vogues in practice: medicine with its leeches, blood letting, appendectomies, tonsillectomies, hysterectomies, etc. (not to speak disparagingly of legitimate practice); dentistry with its ruthless extraction, and then with its equally reprehensible conservation of all teeth however serious a menace they may have been, crowns and bridges, *ad nauseam,* the "100 per cent vitality" gag and removable everything. Shame on us! I should say, except for the fact that we were acting in good faith, following the teachings of our eminent leaders. And so we move on, learning more, striving ever to attain for in no other way can we keep abreast of the times. But I am more discriminating: I don't swallow everything any more, even as I do not try to see how many bushels of samples I can carry home. I have lost that interest; the recent graduate, God bless him, still has it strong.

But really there is, or at least there was, a lot of "bunk" handed out on those occasions. Just an example: A clinic on the use of lead points as root-canal fillings. On the theory that living tissue is quite tolerant of lead, because a lead bullet may become encysted in the body, witness Exhibit A: a buck shot; another, flattened out and rolled thin; another with the

plate cut into points, and rolled into sharp cones, etc. There you are! A revolutionary root-canal therapy. And many of you have never heard of it? Too bad. I was that clinician. I apologize; but I repeat: I deplore such waste of time.

Have you heard of the platinum basket which was implanted in a trephined hole cut in the alveolar process? The bone was supposed to grow into the meshes of the basket and presto! you had an abutment for anchoring a fixed bridge. Ever heard of it? Many of you have not; still it was presented to the Wisconsin Dental Society about fifteen years ago. Now it is forgotten.

As regards clinics: No one will question their value, but I foresee a great change in the next quarter century. I am grateful to the enterprising manufacturer who sends out his representative in order that we may be properly informed. We can always profitably sit at the feet of the man sent out by Kerr, Eastman and others, for their contributions have been most valuable. But, in the future, I see less of the "manufacturers' clinics" and more of postgraduate study. Witness the course in postgraduate work recently established by Joseph C. Schaefer, at the Cook County Hospital, Chicago, and the regular courses given by universities. These things are coming.

Look over your shelves, you older men, and see the accumulation of junk foisted on you by the itinerant clinician. Reflect on the variety of materials that you have tried to your sorrow, now discarded and well-nigh forgotten. Think of the forty-seven varieties of denture bases with which you have been experimenting on your patients. I could muster an array of filling materials, prosthetic devices and therapeutic agents the names of which you younger men have never heard. Let us be charitable and call them stepping stones.

A little about the conduct of the practice of a profession: It is becoming more efficient, yet more dignified. I was once severely reprimanded by one of our confrères, long since departed to his reward, for working evenings. He was old, I was young, energetic, ambitious, and building my practice. Now I am older. I am not displaying any supercilious dignity when I assert that any prospective patient, except in emergencies, should consult his dentist during regular office hours; just as he would consult his attorney during regular office hours. I trust, however, that I haven't forgotten. I now prefer to let my younger brother carry on the night work. I have done my share in my younger day. Few of us now think of having Sunday appointments, though they were quite common with some a quarter century ago.

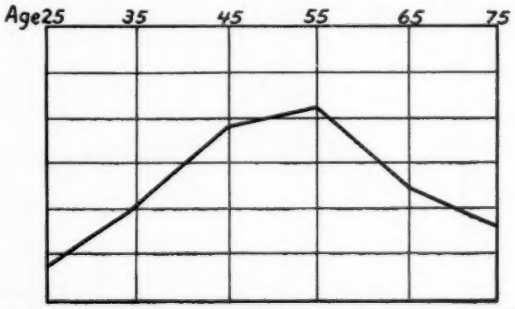

Fig. 4.—Financial standing of dentist, ages twenty-five to seventy-five.

It simply isn't expected of us any more. Time marches on indeed.

Our assistants have no time for crocheting and knitting today. They used to be "office girls." As your practice grows, young man, you will find that there are a thousand and one duties which you can profitably delegate to your assistant. Your time is going to be too valuable to spend at cleaning, sterilizing and telephoning, receiving and dismissing patients, bookkeeping, corresponding, etc. We have all curtailed and retrenched as the result of this recent depression, but I foresee a more nearly universal adoption of the practice of a dental hygienist, which our state statutes fortunately have legalized. I well recall in what a critical spirit some of my confrères reacted to my employment of a hygienist, ten years ago. "Would you want a girl working on you?" they would ask their patients if the subject came up for discussion. Yes, that's the criticism I had to overcome in some instances. Those reports came back to me. But we kept going, and I believe the public are learning the value of a dental hygienist even as they acknowledge the value of a nurse. I believe that many of you could employ a hygienist in your office to your decided advantage when economic conditions improve, as they surely will. You know very well that, in many instances, prophylactic work is sorely slighted. We don't mean to slight it, but we do it nevertheless. I used to, I confess. A properly trained hygienist can render most acceptable services to your patient at a saving to yourself as well as to the patient. Then, assisting in surgical work, in postoperative treatments, irrigations, at the chair, in the laboratory—gentlemen, in a busy practice, a dental hygienist is no ornament, no office decoration and embellishment; she earns her money and spares you many an hour for your more remunerative practice. I'll prove this to you later, but I wish to pay tribute to her here.

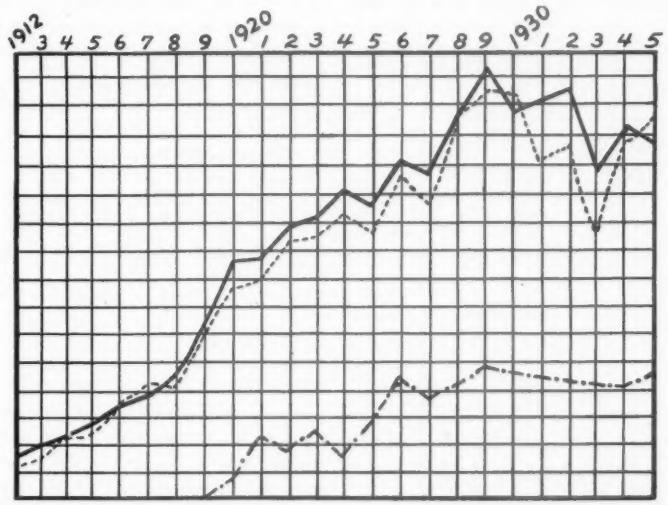

Fig. 5.—Graph of author's practice. In Figures 5 and 6, the solid line represents fees; dotted line, cash; broken line, expenditures.

In discussing the conduct of a practice I cannot overlook the matter of credits. Again, our recent depression may have been responsible for an altered policy that has proved disastrous. We have been moved by sympathy; we have been utterly unselfish; we would not withhold anything that might relieve our unfortunate fellow citizens, certainly not from the children, who were suffering through no fault of their own. And when conditions improved, these people would show their appreciation and would compensate us for our services. Would they? Let us see.

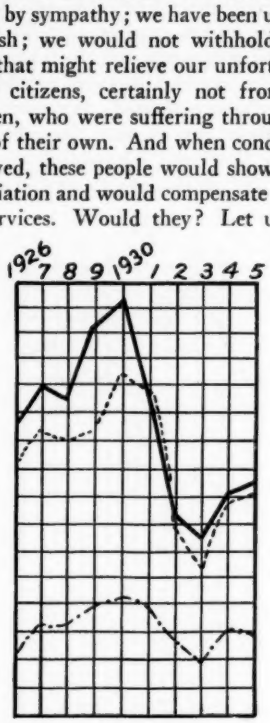

Fig. 6.—Graph of author's friend's practice.

Some there are who did not forget. But many, many have gotten into an unusual frame of mind: They seem to think that obligations are canceled. The atmosphere seems surcharged with that rebellious spirit. The world or the country, the president or somebody owes them a living. As time goes on, we awaken to a realization that these kind friends are no longer our patients. Without any criticism of services rendered, they have felt embarrassed or ashamed to face us and have sought further attention from some one else, preferring to forget their old obligations to us. And we are holding the bag. Gentlemen, the indiscriminate extension of credit for an indefinite length of time is an excellent way to lose patients, and, in my experience, I can definitely enumerate a great number whom I have dismissed in that way.

Young men, give this matter serious consideration. I urge you never to withhold the relief that you can give to him who appeals to you in suffering, but, in justice to yourself and those dear ones dependent on you, protect yourself against the designs of those who prey on you, who enlist your sympathy, get whatever they can from you, literally thumb their noses at you and drift along to the next gullible victim. These floaters are nobody's patients. You don't want them. Care in the extension of credit is the best insurance against dead-beat loss. A few dollars invested in a cooperative bureau will pay you many fold and will be of value to all participants. That is organization and cooperation.

Table 1.—Liability Insurance Rates

Basis	Member Fee	Nonmember Fee
$ 2,500- 7,500	$12	$17
5,000-15,000	13	18
10,000-30,000	15	0

How naturally that introduces the subject of organized dentistry! a subject so vast that we might well select it as a topic for a paper in itself. I must be brief.

We are all familiar with the unanswerable arguments in favor of organization. I can't think of a single one against it, not even the cost. The most recent tangible argument comes from the insurance companies, who seem to believe that there must be a real advantage in having their clients identified with the component-

state-national set-up. Note well the advantage to members or, shall we say, the penalty to non-members. The Medical Protective Co. rates appear in Table 1. You will observe an advantage of $5, which goes quite a way toward the payment of dues. Other insurance companies are doing the same.

But thinking of the future: A change in medical and dental practice is imminent. Just what change will be made and when this will come about, no one knows, but it is inevitable and no one need try to stem the tide. Hearken to the words of George Wood Clapp, after his return from a ten-weeks' study of insurance dentistry in all of the European countries where dental insurance is important.

Nowhere is dental insurance an answer to the needs of the common people for dental service. Nowhere can it be proved to be decreasing sickness. Everywhere it is damaging the practices of dentists serving those who should be above income levels. It is extending lay control. It is increasing the incomes of the lowest grade of dentist and decreasing the incomes of others. I am not opposed to dental insurance. I believe it to be inevitable in this country. I join most heartily in the hope expressed wherever I went that American dentists might take charge of the situation in such a way as to avoid the very serious errors and damage which the profession in practically all other countries has suffered.

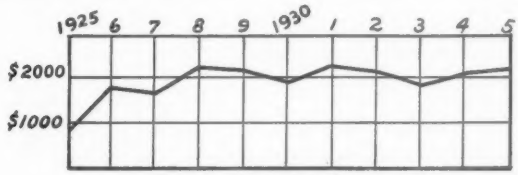

Fig. 7.—Hygienist's fees.

The quest for social security rises in the hearts of all people. 'Tis well it does. We are with them. The cry for relief rises with the decline of wages and salaries. That's why the European countries for years have been trying to solve this problem, which has been non-existent with us. On this subject, read the address of Frank M. Casto, Past President of the American Dental Association, delivered at New Orleans, November 5, 1935, and published in the December 1935, issue of THE JOURNAL. If any legislation that brings a change in dental practice is based upon the experience of other countries as disclosed in that address, we need have no fears. But organized dentistry alone can insure equitable legislation. If we are not organized to help in such a legislative program, we are destined to sink in the mire of inefficiency and injustice. Not for selfish reasons, then, but for the sake of efficiency and justice, let us swear allegiance to the highest ideals of the profession we love. Let us identify ourselves with our national organization (that means state and component as well) and help in the solution of these problems; help in the formulating of plans for insuring social security, for establishing a program that will bring the needed dental services to the many that cannot now enjoy them, that shall keep up the highest standards and shall maintain the very best relationship between the dentist and his patient, with absolute justice to both.

This argument, in my judgment, supersedes and transcends all other arguments for joining our Dental Association. Let us forget all selfish arguments. Let us quit enumerating the benefits that *we* may derive and, with at least a modicum

of altruism, sustain the organization which, in the matter of dental service and dental relationship, is striving for justice for all.

Every age views the problems of life in its own light. As young men starting the practice of our profession, everything looks rosy to us. We are optimistic, hopeful, confident. We struggle along. The years lengthen. By and by, we realize that some of our dreams aren't coming true. Retirement doesn't seem so near at hand. Time has brought new and greater responsibilities. The struggle continues unabated. The quarter century mark is reached, and from our alumni committee comes an invitation in substance like this:

"Come to the alumni meeting. Ours is the honor class this year. At commencement, you were sure you would have retired before the lapse of twenty-five years, but perhaps, like all the rest, you are still scratching for a living. Come and meet your old classmates," etc.

That's the story. Still carrying on. Now just how long can we carry on? Is there a physical limit? Need we be told how confining and exacting is our work? Not we older ones. But perhaps you younger men might profit by a little statistical exposition of some of these pertinent facts. Even so, as youngsters, you will say, "All very true, but that doesn't apply to me; my work isn't going to get me; I'm going to keep on till I retire." That's the spirit of youth.

We have three interesting charts (Figs. 2-4) compiled by Joseph Devney, of Cleveland. While these may not apply to every community, they represent perhaps a fair average. Their lessons are obvious, showing the financial standing of three professional men at each ten-year period. Note the period of ascendency, the zenith, the decline and the final resting place. The lawyer and the physician have potential value late in life as counsel and consultant, but the dentist has descended to zero.

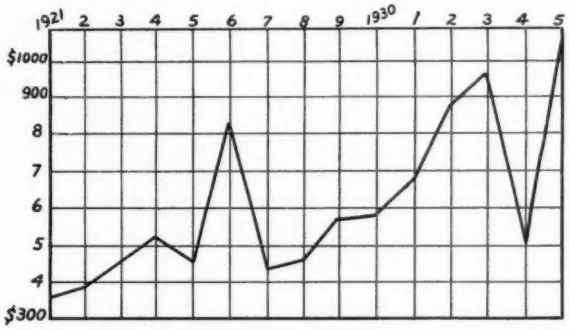

Fig. 8.—Total taxes.

Figure 5 is a graph of my own practice. In this and succeeding charts, actual figures are not given, as the object is merely to indicate the trend. The heavy line represents work done (fees); the dotted line, cash receipts; the broken line, office expenditures. The decline in 1927 was occasioned by incapacitation due to a broken hand. A factor in the rise beginning in 1925 was the employment of a hygienist.

Now compare this with the chart of a friend of mine in a neighboring city, also with two assistants and three chairs. (Fig. 6.) You will observe the parallel-

ism and you will note that we were a little slow getting into the depression and are also slow getting out.

You may be interested in the graph of the hygienist's activity (Fig. 7), riding on even keel, you will observe, and reflecting the ups and downs less markedly.

There are a few pertinent factors in these business affairs that I should like to emphasize. One is the rising tide of increasing taxes. The graph in Figure 8 considers all taxes, business and personal. But since business itself has been on the upgrade, it would be more fair to give the ratio between taxes and income. This percentage is given in Figure 9.

The high peak of 1926 was due to paving taxes at my home. The low in 1934 was the year we wrote off some of our losses. Note the upward swing from 1928. And it's going to be worse.

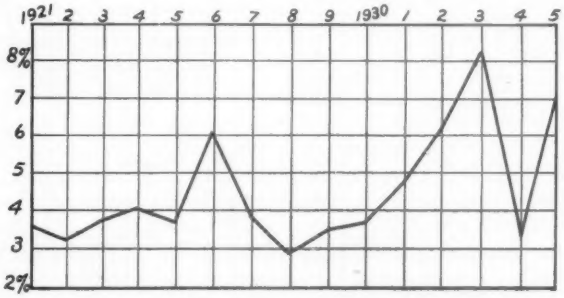

Fig. 9.—Tax percentage based on income.

While I have spoken previously of the indiscriminate extension of credit, I want, in this next chart (Fig. 10) to make a confession and show what has actually befallen me. I thought I was being kind, but see the harvest. Perhaps time will justify me in my policy.

Let us get back to our paper. Here we are at the peak. It is practically the quarter century mark. What is taking place in the life of this dentist? Father Time sprinkles a little frost on the temples (unless baldness has supervened) and carves deep furrows in the face. The hand isn't quite so steady. The knees and feet are giving out. There is puffing and wheezing on exertion. The hearing isn't so keen. The vision is in need of frequent correction. The arm reach lengthens to accommodate the eyes. The strenuous action of hunting and fishing gives way to golf and vacations of auto trips. Verily, our mental attitude has changed. Life has become serious. Speculation and the interest in the stock market have waned. We are thinking of security. Our responsibilities are resting heavily upon us. Ultimate retirement is out of the question. We are just hoping and praying that we may continue to work till the end. We make a will.

Perhaps the physical changes have become even more marked. It appears that we have cultivated a little hypertension; our physician calls our attention to a definite arteriosclerosis. And those rheumatic joints! Wonder if we hadn't better have our teeth out.

In our daily routine, we have some unusual thoughts about our work. "O, that equipment will last as long as I can keep going. No, I needn't buy any more crowns and teeth and supplies, these will last." What insidious approach of age is this, anyway? Are we beginning to admit

some things? Yes, friends, it's the new aspect on life. Now we wish we hadn't given so much thought to the market and margins (of the market variety—more to the dental variety). With heavy heart, we scan the beautifully engraved stock certificates and other wall paper whose value has faded in thin air. We really haven't been very careful in providing for the future. The wise buisness man or manufacturer will begin to "write off" the minute a machine is installed. When it is worn out, sufficient money will have been set aside to buy its successor. How many of us have considered this rule in dealing with our bodies? Have we built up a reserve for the depreciation of our bodies? Young men, you don't want advice, but I beg of you to give this matter serious consideration while you are young. I am not trying to sell you anything, but I do wish I could burn into your consciousness the great value of adequate life insurance, which will provide for your loved ones in case you pass out of the picture, but, more particularly, which will provide for you yourself when earning power has faded and you have become obsolete. Prof. Solomon Huebner, of the Wharton School of Finance, points out that only 2 per cent of people show adequate judgment for profitable investment of their earnings, and that the 98 per cent lose annually through poor investments more than the annual total of all life insurance premiums. Attractive policies with annuities are offered to cover every conceivable case, and you may as well admit that the investment committees of the insurance companies know more about investing than you, even as you know more about dentistry than they. Play safe.

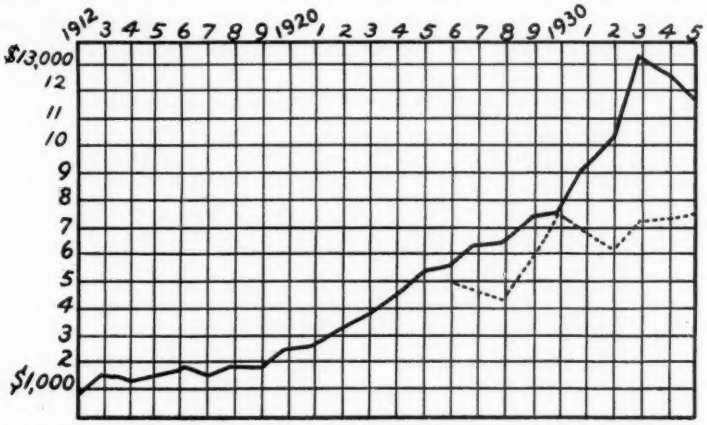

Fig. 10.—Accounts receivable. Solid line, author's; dotted line, friend's.

In Figure 4, we are back again at the pinnacle. What goes up must come down. Our chart leads down to the very level at which we started. There are still some years to go, but the decline is inevitable and rapid. Let the young men take due notice.

You really are not deceiving yourself in the belief that our superior degree of intelligence is going to provide against any further depressions, are you? Let us examine the chart (Fig. 11) prepared by

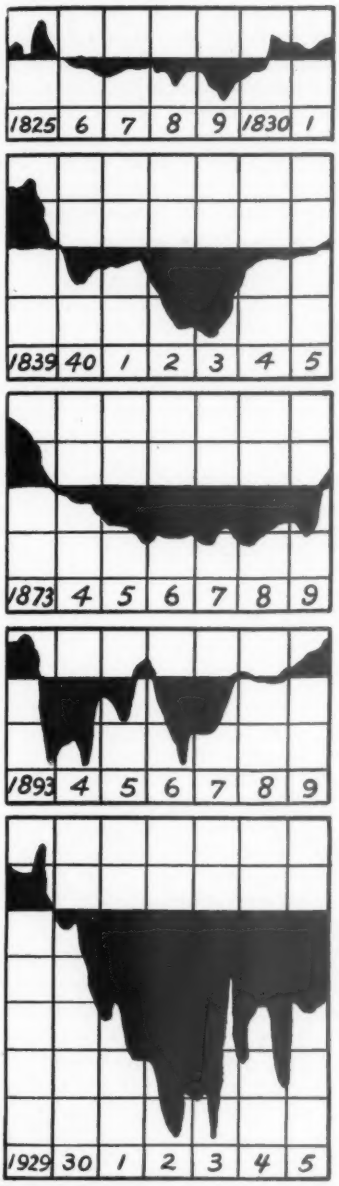

Fig. 11.—Business activity in five long depressions. (Cleveland Trust Co.).

the Cleveland Trust Co., showing the five worst depressions in United States history translated into terms of business activity.

Conditions are on the upgrade, but the present depression, now in its seventh year, has surely been the most severe and longest of them all, in spite of our federal reserve banks, which were to obviate such calamities in the future. The shaded portions show business above or below par. The lowest diagram shows that we are still far below par. Some of us may never see another depression, but I fear such inky periods are still inevitable; for though the individual changes, human nature doesn't change much. Not in a generation nor a century.

But hold! we are going afield: We have discussed the dentist's yesterday. Gradually, with a courageous display of virility, he has ascended to the heights. Life has been a challenge that has called out his best. What about his today? Now he descends the sunny slopes and the shadows lengthen behind him. No reason for becoming gloomy and discoursing about his diminished usefulness. Not at all. Life has many beautiful compensations for him to enjoy. But it's time to recognize the facts and live accordingly.

William Lyon Phelps, aged 70, commented:

> I think I can point out the exact moment when a man begins to grow old. It is the moment when upon self examination he finds that his thoughts and reflections in solitude turn more to the past than to the future. If a man's mind is filled with memories and reminiscences instead of anticipations then he is growing old.

At a dinner given him on his seventieth birthday, C. N. Johnson said:

> Age is not a matter of years; it is a matter of health and point of view. If you are well and your vision is in the future, you are not growing old.

But let there be hope and faith, for "the

best is yet to be, the last of life for which the first was made." And examples are innumerable in which certain individuals by sheer work have accomplished great things late in life.

Is the picture really so dark a one for the young dentist? On the contrary, I have tried to point out, though I recognize how unwelcome advice really is, several points that, in my judgment, might be helpful in the conduct of his practice; and the promise of success, it seems to me, was never greater than today.

In the first place, there is an increasing recognition of the value of dental service, as I have indicated previously. I believe that cannot be gainsaid. If the population and number of dentists were to remain stationary, the prospects would be rosy. But they are even better, as you will note by the charts (statistics by courtesy of the American Central Trade Association) in Tables 2 and 3.

TABLE 2.—POPULATION

Year	Population of U.S.
1850	20,000,000
1890	63,000,000
1910	92,000,000
1930	123,000,000
Prospective gain	1,000,000 } Annually
to	1,700,000 }
1950	150,000,000 (Estimated)

Statistics may be uninteresting, but they tell a tale. Aside from their disclosures, you young men have every reason to face the future with happy anticipation. Cooperation among us dentists and our medical brethren is growing. Research in science is placing our work upon a more rational basis. Prosthetic appliances have never before attained so high a degree of perfection. The opportunity to render genuine service to our patients and hold our practice was never better. The dawn of a brighter economic day is growing rapidly more rosy. Appreciation on the part of our patients as the result of a rational educational program is steadily increasing. But the keystone in the arch of success after all is service—sympathetic, patient, honorable service, unselfish devotion to the highest ideals. That is not mere dogma: it is the characterization of the teachings of the greatest Man in human history.

TABLE 3.—DENTAL STATISTICS (FROM THE AMERICAN DENTAL TRADE ASSOCIATION)

Year	Dental Colleges	Students	Dental Graduates
1920	58		
1			1795
2			1765
3		13,100	3271
4			3422
5			2590
6			2610
7			2642
8		8,500	2563
9			2442
1930	39		1561
1			1500
2			2000
3			1875
4			1832
5			1823

Year	No. Practitioners
1910	40,000
1928	62,584
1931	58,004

Loss in three years	4,500
Graduates never practicing	15%
Estimated annual loss	1974

In the next quarter century, we older men will have stepped aside. But you younger men will be carrying courageously on. The mantle will be upon your shoulders, the light in your hand. Hold it high and carry on. It is a noble task that you have to perform and you will enjoy an inner satisfaction if you do it well, knowing that you have not only honorably provided for yourself and

your loved ones, but have also been actively engaged in the work of alleviating the suffering of humanity and of keeping the human individual in a state of health and efficiency, thereby contributing greatly to his comfort and happiness. And what more honorable pursuit is there on earth?

DENTAL DEFECTS AMONG NAVY APPLICANTS

TOTAL number of applicants applying at U. S. Navy recruiting station, Naval Reserve Armory, Indianapolis, Ind., during calendar year, 1936.....1244

Number of applicants rejected—physical defects ..... 872—70 per cent
Number of applicants rejected—"other causes" ..... 143—11 per cent
Number of applicants physically qualified ..... 228—18 per cent

Of the 228 whose physical condition was such that they could be accepted, 113, or 9 per cent, were given Class "A" physical rating and the remaining 115 were given Class "B" physical rating.

The five major disqualifying defects together with the number of each were as follows:

Defective teeth	137
Abnormalities of teeth	123
Errors of refraction	118
Defection, physical development	112
Flat feet	67
	557

Defective teeth, 131, and abnormalities of the teeth, 123, account for 254, or 29.1 per cent of the total physical rejections, 872.

The report shows that in addition to the 254 applicants who were rejected primarily because of bad dental conditions, 178 of the other men on the rejected list had very marked dental conditions which could be considered a contributing factor in their rejection.

Adding the 178, whose dental conditions contributed to their failure to pass the examination, to the 254 already noted, gives a total of 432, or at least 50 per cent of the 872 disqualified who had serious dental defects.

Submitted by E. H. BRUENING, D.D.S., from report by H. D. Templeton, M.D., U. S. N.

MEETING OF THE COMMITTEE ON ECONOMICS

THE Committee on Economics of the American Dental Association will hold a meeting in Room 122, Ambassador Hotel, Atlantic City, N. J., at 9:00 a.m., Sunday, July 11th. All members and deputies of the committee are urged to be present; others interested in dental economics are invited.

LON W. MORREY, *Secretary.*

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

The following articles have been accepted as conforming to the rules of the Council on Dental Therapeutics of the American Dental Association. The Council wishes dentists to understand that the admission of an article does not imply a recommendation. A copy of the rules that govern the Council in the consideration of articles will be sent on request.

SAMUEL M. GORDON, *Secretary.*

DENTIFRICES*

At the request of several large manufacturers of dentifrices, the Council agreed to accept merchant brands of dentifrices. A merchant brand of a dentifrice is one that has been made acceptable by the manufacturer, and which, in turn, bears the name of the distributing agency. The following merchant brands have been accepted.

B. Altman & Company Tooth Paste.—Composition: See Sheffield Tooth Paste. (J.A.D.A., **24**:825, May 1937.)

Manufactured by the Sheffield Company, New London, Conn. Distributed by B. Altman & Company, New York City.

S.V.B. Tooth Paste.—Composition: See Sheffield Tooth Paste (J.A.D.A., **24**:825, May 1937.)

Manufactured by the Sheffield Company, New London, Conn. Distributed by Scruggs-Vandervoort-Barney, St. Louis, Mo.

Pogue's Dental Cream.—Composition: See Sheffield Tooth Paste (J.A.D.A., **24**:825, May 1937.)

Manufactured by the Sheffield Company, New London, Conn. Distributed by the H. & S. Pogue Co., Cincinnati, Ohio.

Announcement of acceptance of other merchant brands of dentifrices will be made from time to time.

LOCAL ANESTHETICS†

Reliance 2% Procaine Solution with Neo Synephrine Hydrochloride 1:3700: Each cubic centimeter is said to contain procaine hydrochloride, U.S.P., 0.02 gm., sodium chloride, 0.0021 gm., sodium bisulfite, 0.0015 gm., sodium phosphate exsiccated, 0.0005 gm., neo synephrine hydrochloride (Stearns) 0.00027 gm., and distilled water to yield an isotonic solution.

Manufactured by Reliance Dental Manufacturing Company, Chicago, Ill. No U. S. patents or trademarks.

Reliance 2% Procaine Solution with Neo Synephrine Hydrochloride 1:3700 in Cartridges.

The following U.S.P. products of Merck & Co., Inc., are admitted to Accepted Dental Remedies as brands of official drugs listed in Accepted Dental Remedies. They will appear in the next edition of the book.

Acetanilid Merck, U.S.P., Acetone Merck, U.S.P., Acetphenetidin Merck, U.S.P., Acid Acetylsalicylic Merck, U.S.P., Acid Benzoic Merck, U.S.P., Acid Boric Merck, U.S.P., Acid Hydrochloric Merck, U.S.P., Acid Nitric Merck, U.S.P., Acid Phosphoric

*Accepted Dental Remedies, 1935, p. 91.
†Accepted Dental Remedies, 1935, p. 34.

Merck, U.S.P., Acid Sulfuric Merck, U.S.P., Acid Tannic Merck, U.S.P., Acid Trichloracetic Merck, U.S.P., Aminopyrine Merck, U.S.P., Ammonia Water Merck, U.S.P., Ammonium Carbonate Merck, U.S.P., Acid Arsenous Merck, U.S.P., Atropine Sulfate Merck, U.S.P., Balsam Peru Merck, U.S.P., Barbital Merck, U.S.P., Barbital-Sodium Merck, U.S.P., Benzocaine Merck, U.S.P., Betanaphthol Merck, U.S.P., Bismuth Subcarbonate Merck, U.S.P., Bismuth Subnitrate Merck, U.S.P., Caffeine Merck, U.S.P., Caffeine Sodium Benzoate Merck, U.S.P., Calcium Chloride Merck, U.S.P., Calcium Gluconate Merck, U.S.P., Calcium Lactate Merck, U.S.P., Chloroform Merck, U.S.P., Acid Chromic Merck, U.S.P., Cocaine Hydrochloride Merck, U.S.P., Codeine Alkaloid Merck, U.S.P., Codeine Phosphate Merck, U.S.P., Codeine Sulfate Merck, U.S.P., Cresol Merck, U.S.P., Solution Cresol Compound Merck, U.S.P., Ether Merck, U.S.P., Eugenol Merck, U.S.P., Formaldehyde Merck (Solution Formaldehyde) U.S.P., Glycerin Merck, U.S.P., Guaiacol Merck, U.S.P., Hydrogen Peroxide Solution Merck, U.S.P., Iodine Merck, U.S.P., Iodoform Merck, U.S.P., Solution Ferric Subsulfate Merck, N.F., Iron Sulfate Merck (Ferrous), U.S.P., Lanum Merck (Lanolin, U.S.P.), Magnesium Carbonate Merck, U.S.P., Magnesium Sulfate Merck, U.S.P., Menthol Merck, U.S.P., Mercury Merck, C.P., Mercury Bichloride Merck, U.S.P., Morphine Sulfate Merck, U.S.P., Oil Betula Merck, U.S.P., Oil Cloves Merck, U.S.P., Oil Eucalyptus Merck, U.S.P., Trioxymethylene (Paraformaldehyde) Merck, U.S.P. X, Phenobarbital Merck, U.S.P., Phenobarbital Sodium Merck, U.S.P., Acid Carbolic (Phenol) Merck, U.S.P., Potassium Bromide Merck, U.S.P., Potassium Bicarbonate Merck, U.S.P., Potassium Permanganate Merck, U.S.P., Resorcin (Resorcinol) Merck, U.S.P., Saccharin Merck, U.S.P., Silver Nitrate Merck, U.S.P., Silver Protein Merck Strong, U.S.P., Soap Soft Merck, U.S.P., Sodium Bicarbonate Merck, U.S.P., Borax (Sodium Borate) Merck, U.S.P., Sodium Bromide Merck, U.S.P., Sodium Chloride Merck, U.S.P., Strychnine Sulfate Merck, U.S.P., Thymol Merck, U.S.P., Thymol Iodide Merck, U.S.P., Zinc Chloride Merck, U.S.P., Zinc Oxide Merck, C.P. Reagent. (Zinc oxide analytical reagent contains not more than 0.0002 per cent arsenic. The U.S.P. does not require a definite statement of the arsenic content.)

Manufactured and distributed by Merck & Co., Inc., Rahway, N. J. No U. S. patents or trademarks.

The Council continually receives requests for information from dentists on topics within its province. These are referred to members of the Council or to other competent authorities for reply. These replies are transmitted to the individual dentist as a service of the Council's office. Certain of these inquiries and answers which appear to be of general interest will be printed in these columns from time to time.

HYPERSENSITIVE DENTIN

Question: I have a most unusual case on which I would like to have your advice. It involves an upper first molar from which the gum has receded at least one third the distance from the enamel line. I have cauterized it several times with a saturated solution of nitrate of silver, but it continues to be so sensitive that the patient is unable to drink water or other fluids at an average temperature. Please advise me what you would suggest that I do other than removing the pulp. R.T.S., Virginia.

Answer: Hypersensitiveness of dentin implies an uncommonly sensitive or painful response of the exposed dentin to irritation. This includes dentin exposed by caries, attrition, abrasion or erosion, by failure of the enamel to meet the cementum and by marked atrophy of the alveolar process, exposing both dentin and cementum.

Practically all of the medicaments used in the treatment of hypersensitive dentin are caustics. In a report prepared for the Council by Louis I. Grossman (J.A.D.A., 21:2050,

November 1934) it was pointed out that the following drugs in the order of their importance may be safely applied: (1) ammoniacal silver nitrate, (2) solution of formaldehyde and (3) sodium-potassium carbonate paste.

The treatment is divided into three phases: (1) preparation of the hypersensitive area, (2) application of the medicament and (3) protection of the hypersensitive area.

It is absolutely necessary to rid the hypersensitive area of its coating of food débris, fatty matter, mucin, etc., in order to expose the dentinal fibrils to the action of the medicament. Unless this is done, the best medication may fail. The treatment is carried out by cleansing first with pumice paste, and isolating with a dam until the tooth is thoroughly dry. After application of a mixture of equal parts of benzyl alcohol and chloroform solution, the dentinal surface is ready for the application of the medicament. Any one of the three drugs mentioned may be applied, but the latter two should be used to guarantee against staining.

The application of the medicament is followed by the application of a protective varnish. The gum copal varnish suggested by Gordon (J.A.D.A., 23:2374, December 1936) may be used or one composed of gum mastic, 1 part, gum sandarac, 4 parts and alcohol, 16 parts. Franken has suggested the use of large amounts of calcium products such as milk, calcium lactate or calcium gluconate, but the advisability of this needs to be confirmed on a larger scale and under carefully controlled conditions. (J.A.D.A., 18:156, January 1931).

EVIPAL SOLUBLE

(Continued from June 1937, page 1006.)

VI. ADVANTAGES

Some of the advantages of Evipal Soluble can be stated only in general terms, because what constitutes an advantage in one case may be of slight importance in another. A patient's fear and anxiety increase the danger of a severe operation, and the avoidance of psychic disturbance is probably the greatest advantage possessed by Evipal Soluble anesthesia. With the injection of the solution, the patient usually experiences nothing more than the prick of the needle before becoming drowsy and losing consciousness almost immediately. When the dose is calculated with skill and the drug is injected slowly in suitable cases, the depth of anesthesia is usually under control nearly equal to that with ether—better, according to a few enthusiasts.

Vomiting occurs less frequently than after ether. It is probable that it occurs after Evipal Soluble alone in about 1 per cent of the cases, but the conflicting testimony is hard to reconcile. Coryllos and Bass,[23] who used preliminary doses of one-third grain of pantopon, reported vomiting in 24.7 per cent of their cases in operations for thoracoplasty. Greenberger and Bass[38] reported that 6 per cent of their patients vomited after urologic operations. Several report that none of their patients vomited after the injection of Evipan Sodium alone, and Decker[39] stated that none of 112 patients vomited. He used morphine in doses of 20 mg. half an hour before the operation.

Evipal Soluble does not irritate the respiratory passages. This is an especial advantage for patients having bronchial or pulmonary inflammation, and pneumonia occurs less frequently after its use than after ether. Decker also reported that no case of pneumonia occurred in his series of 112 operations, mainly laparotomies. The anesthetic does not

38. Greenberger, M. E., and Bass, Sara: Urol. & Cutan. Rev., 39:555, 1935.
39. Decker, R.: Münchcn. med. Wchnschr., 81:395, 1934.

appear to injure the healthy vital organs. The absence of a mask is important in operations about the head.

VII. DISADVANTAGES

Little is said in the advertising about the disadvantages of Evipal Soluble, but many of these are apparent from the present discussion. First in importance, and far outweighing all others, are the uncertainty of the proper dosage in many cases, and the uncertainty regarding the relative contraindications, because so many conditions must be considered and each given its due weight when calculating the dosage.

Evipal Soluble depresses the respiration and the circulation; often sharply, sometimes fatally. Lauber[29] states that the fall of blood pressure is greater in patients with arteriosclerosis than in normal persons. It is probably that this explains some of the deaths that have been reported in elderly patients. The fine or coarse tremor (less frequent after morphine), the incomplete relaxation of the abdominal muscles, especially in the presence of reflexes, the necessity of a skilled anesthetist, and the undue prolongation of narcosis even after small doses in some cases are among the disadvantages, some of which have been enumerated previously in this discussion.

Landor and Salleh[40] reported a case of widespread paralysis which followed the use of Evipan Sodium. There is no evidence that the anesthetic caused the paralysis. Peterkin[41] reported dermatitis in an anesthetist. Belfrage[42] stated that during the previous year a few cases, three or four he believed, had been described in which Evipan had been followed by severe disturbance of the blood, taking the form of myelogenous leukemia.

VIII. INDICATIONS AND CONTRAINDICATIONS

There is a want of agreement concerning the indications and contraindications for the use of Evipal Soluble. The Anesthetics Committee of the Medical Research Council[3] stated that thorough pharmacologic work had been carried out in Germany with Evipan. The individual experiments may have been thorough, but the published results were of limited scope and left much to be learned at the expense of patients. Sauerbrüch[43] stated that the manufacturers should have made exhaustive studies of the drug before marketing it. This statement was based on the fact that many accidents to patients had occurred. Domanig[44] expressed agreement with Sauerbrüch. Domanig presented an excellent discussion, but much has been learned by clinical experience since his paper appeared.

Evipal Soluble finds its special field of usefulness in the hands of those who are skilled in its use, for light anesthesia or the "rausch" of German anesthetists, which is suitable for short operations, such as simple incisions, changing painful dressings and the removing of teeth; and also for inducing anesthesia which is to be continued with ether or some other volatile anesthetic, provided the patients are in good general condition and are free from disturbance of the circulatory or respiratory system.

One who has had an unfortunate experience with a new anesthetic is inclined to consider certain conditions of the patient in whom the accident occurs as contraindications for that anesthetic. The result is that there are many contraindications reported which do not find general acceptance. Many hold that there is no absolute contraindication but that there are relative contraindications which vary in degree from the almost negligible to nearly absolute. One finds it warmly recommended for conditions that others hold to constitute absolute contraindications.

40. Landor, J. V., and Salleh, Mohamed: Brit. M. J., 2:940 (Nov. 24) 1934.
41. Peterkin, G. A. G.: Brit. M. J., 1:456 (March 10) 1934.
42. Belfrage, D.: Proc. Roy. Soc. Med., 29:709, 1936.
43. Sauerbrüch: Zentralbl. f. Chir., 62:600, 1935.
44. Domanig, E.: Wien. klin. Wchnschr., 48:1245, 1935.

The consensus of those whose opinions have impressed the Council's referee is that the relative contraindications include liver disease or liver dysfunction, severe septic conditions, ileus, peritonitis, extensive hemorrhage, anemia, emaciation, general weakness, cachexia, phlegmon of the throat, extensive arteriosclerosis, and depressed state of the circulatory or respiratory system. No hard and fast rule can be stated, and skill and experience are required in many cases to determine whether a given condition, or combination of conditions, constitutes an absolute bar to the use of the drug.

Any relative contraindications must be taken into consideration when calculating the dosage, and with that understanding the drug may be indicated when its advantages outweigh its disadvantages.

IX. SEVERE, BUT NOT FATAL, ACCIDENTS

Weese[45] stressed the "extraordinary therapeutic ratio of Evipan Sodium, because it has a strikingly slight action on the respiratory and vasomotor center." He had previously stated that there had not been one dangerous occurrence among 10,000 cases of Evipan Sodium narcosis but that there had been one unexplained death. That death was "unexplained" merely because adequate studies of the actions of Evipan Sodium had not been made under widely varying conditions. It was an Evipan Sodium death (reported by Petermann).

Anschuetz[32] reported at the German Surgical Congress in April 1933 seven severe accidents that had followed the use of Evipan Sodium. There was severe circulatory failure in five and moderate failure in one. Three of the patients died within thirty-six hours. The Council's referee believes that the drug was partly responsible for one of these deaths and has included it in a list to be given presently.

Stimpfl[46] collected twelve additional reports of severe accidents involving disturbance of the respiration or circulation or both. He attributed these accidents to overdosage and held that they were avoidable. Toxic actions are evidence of overdosage, but it is precisely because overdosage is so difficult to avoid with surely effective doses that accidents continue to occur.

Ménégaux and Sechehaye[47] reviewed the literature embracing about 200 papers dealing with Evipan Sodium. They tabulated forty-nine severe accidents, giving the name of the author, the sex, age and weight of the patient, a brief history, the dose (often unknown), the rate of injection, the interval before the onset of the accident, its character, antidotes employed, and the result of the treatment. Five of these patients died, four of them within thirty-six hours; but those authors do not attribute any of these five deaths to the anesthetic. One of the severe accidents occurred after an interval of three days; the referee does not believe that it should have been included in the list, since he does not find any evidence that it was caused by Evipan Sodium.

The onset of the accident was immediate or within five minutes in eighteen cases; in nearly all the others the time of onset is not recorded. In nearly every case there was asphyxia, cyanosis or collapse. Many others have reported severe accidents, and among these Coryllos and Bass[23] as late as 1936. The study of severe accidents throws much light on the cause of death in other cases, and, while the subject is obviously of great importance, a comprehensive discussion of these reports would require more space than can be devoted to it here.

X. DEATHS

Anschuetz[32] also reported eight deaths following the use of Evipan Sodium at the

45. Weese, H.: Klin. Wchnschr., 12:1309, 1933.

46. Stimpfl, A.: München. med. Wchnschr., 80:1429, 1933.

47. Ménégaux, G., and Sechehaye, L.: J. de chir., 44:363 (Sept.) 1934.

same time that he reported the seven severe accidents. These were reported by those who had used Evipan Sodium in 6,460 operations. Several subsequent writers have stated that these eight deaths occurred in the first 6,460 cases in which the drug was used. This is not the case; there had been about 25,000 anesthesias with it apparently, and many reported that there had been no accident.

Anschuetz stated that these deaths were due to relative overdosage but that one reported by Petermann was serious; meaning, presumably, that it was not predictable. Some subsequent writers have concluded that all these eight deaths were due to the anesthetic; others have attributed only one or two of them to the drug.

Stimpfl[46] listed eleven deaths, including those reported by Anschuetz, one reported by Gritti, one by Killian and one that "occurred in a small hospital."

There was paralysis of respiration in 34 per cent and severe depression or paralysis of the heart or circulation in 38 per cent of the total of twenty-nine cases—nineteen accidents and ten deaths—with details lacking in the case reported by Gritti. The high percentage of circulatory disturbances is of special importance, because it shows that the statement of Weese that fatal doses always cause death by paralysis of respiration is dangerously misleading. This statement is also made in the literature issued by the manufacturers in such a way as to imply that it is true in clinical cases.

Ménégaux and Sechehaye[47] tabulated twenty-two deaths that had occurred during or following anesthesia with Evipan Sodium in about 23,000 cases. They state that Jacobson reported another death after the table had been prepared. It is not included in the present discussion because the data do not indicate the cause of death sufficiently. These twenty-two deaths embrace all that Anschuetz had reported and all—with possibly one exception, that reported by "a small hospital"—which Stimpfl listed. These twenty-two deaths are listed here with the numbers used by Ménégaux and Sechehaye, with references to original reports when possible, in order to facilitate the present discussion and for the convenience of the reader in consulting original reports.

Deaths listed by Ménégaux and Sechehaye:

1. Moulonguet: *Presse méd.*, 42:337.
2. Boden: *Fortschr. d. therap.*, 1933, No. 12, p. 718.
3. Ohse: *Zentralbl. f. Chir.*, 60:2380, 1933.
4. Sicard: *Bull. et méd. Soc. nat. de la chir.*, 60:573, 1934.
5. Stimpfl, A.: *München. med. Wchnschr.*, 80:1429, 1933.
6. Hogenauer: *Zentralbl. f. Chir.*, 61:517, 1934.
7. Reschke: *Zentralbl. f. Chir.*, 62:1703, 1935.
8. Gritti (no reference given).
9. Hammermann: Thesis; not available to referee.
10. Moerl: *Zentralbl. f. Chir.*, 60:877, 1933.
11. Schmitt (reported by Schmutzler): *Klin. Wchnschr.*, 12:1309, 1933.
12. Schmitt (reported by Schmutzler): *Klin. Wchnschr.*, 12:1309, 1933.
13. Petermann: *Zentralbl. f. Chir.*, 62:600, 1935.
14. Doerderlein: *Zentralbl. f. Chir.*, 62:598, 1935.
15. Ménégaux and Sechehaye: *J. de chir.*, 44:363, 1934.
16. Hoevelborn: *Klin. Wchnschr.*, 13:372, 1934.
17. Killian: *Arch. f. klin. Chir.*, 177:53, 1933.
18. Holtermann: *München. med. Wchnschr.*, 80:1547, 1933.
19. Nordmann: *Zentralbl. f. Chir.*, 62:598, 1935.
20. Duboucher, Megnin and Sarlin: *Bull. et mém. Soc. de chir.*, 60:572, 1934.
21. Harms: *München. med. Wchnschr.*, 1934, p. 847.
22. Boit: *Deutsche med. Wchnschr.*, 59:983, 1933.

It is to be observed that some of the references given here apply to papers published subsequent to that of Ménégaux and Sechehaye.

Ménégaux and Sechehaye eliminate three of these deaths (6, 15 and 9) as certainly due to disease; they state that the cause of death in two cases (8 and 19) is unknown.

However, one of these (Nordmann's) is of especial interest because Anschuetz said of this "Do not blame Evipan too much." Nordmann informed Stimpfl that the patient, a man of 86, suffering with gangrene, received a dose of 8 cc. and died from heart failure due to the anesthetic. Four of the deaths (13, 16, 18 and 20) are listed as "probably due to Evipan Sodium" but with serious reservations in three. In five cases (3, 4, 11, 12 and 21) the anesthetic is stated to have been absolutely contraindicated and in nine (1, 2, 5, 6, 7, 10, 12, 14 and 17) it was relatively contraindicated. There was overdosage in eight. They state that it is possible that twelve deaths (3, 5, 6, 7, 10, 11, 12, 13, 14, 17, 18 and 19) were due wholly or partly to Evipan Sodium.

The onset of the accident—not the time of actual death—was "immediate" in seven cases (1, 2, 6, 18, 20, 21 and 22), within one-half to fifteen minutes in six (3, 4, 10, 12, 14 and 17) and "shortly," "at end of operation," or "in some minutes" in three cases (5, 7 and 13).

It would be a remarkable coincidence if there were no immediate connection between cases of overdosage and contraindications and the deaths that followed. There would be no object in mentioning a death under the circumstances if there were no connection between the anesthetic and the cause of death; nevertheless, many of the authors, including Ménégaux and Sechehaye, deny that the deaths which they report were caused by the anesthetic. It is practically certain that some of these deaths would be avoidable in the light of our present knowledge. It is probable that some of these patients would have died with any anesthetic and that some would have died shortly without any anesthetic or operation; but the present analysis is intended to direct attention to ways of avoiding accidents, not to accuse any individual anesthetist of carelessness.

Stohr and Niederland[48] tabulated fifteen deaths which they considered as certainly, or almost certainly, due to Evipan Sodium. These include twelve of those reported by Ménégaux and Sechehaye and three reported by Steinbrüch. Desplas[49] attributed twenty-three deaths to Evipan Sodium, with the cause of another in doubt. His list includes three duplications, the record of one which was apparently only a minor accident, not a death, and one of which the referee finds no other record (Bassler's). Two deaths reported by Schmidt and included in the list of Ménégaux and Sechehaye were also reported by Schmutzler.[50]

The referee has collected reports in the literature of twenty-one deaths in addition to the twenty-two reported by Ménégaux and Sechehaye and has analyzed independently the original reports of all but three of the twenty-two included in the list of those authors. The reports of these twenty-one deaths will be reviewed briefly. The dates of the reports are given in the text because it is of interest to consider the list historically. It is certain that some deaths which occurred early in the use of Evipan Sodium were attributed to other causes or to causes unknown, because it was supposed that the anesthetic was free from danger. (Cf. comments on death reported by Petermann.) Unfortunately, the date of published reports does not always coincide with the date of the accident.

1. Baucks[51] (1933) reported that a patient with peritonitis, appendicitis and intestinal paralysis collapsed after the injection of 3 cc. of Evipan Sodium; the pulse was imperceptible; the intended operation was not performed; there was slow improvement; death resulted from peritonitis after twenty-four hours. The referee believes that this was a most unfavorable case for the use of Evipal Soluble and that the anesthetic was a contributory cause of death. Baucks also reported that a man of 66 suffered severe collapse after the injection of 2 cc. of Evipan Sodium but recovered; the patient died of intestinal

48. Stohr, R., and Niederland, W.: Wien. klin. Wchnschr., 48:993, 1935.

49. Desplas, B.: Bull. et mém. Soc. nat. d. chir., 60:1129, 1934.

50. Schmutzler: Klin. Wchnschr., 12:1309, 1933.

51. Baucks, K.: Zentralbl. f. Chir., 60:306, 1933.

paralysis after an interval of thirty-six hours. It is impossible to state whether the anesthetic hastened the death.

2. Zantop[52] (1933) reported that the injection of 4 cc. of Evipan Sodium caused sleep lasting three hours in a patient suffering with meningitis. Weakness of the heart and respiration necessitated the use of restoratives; death occurred after an interval of thirty-six hours. The anesthetic probably contributed to the cause of death, which would have occurred shortly had no anesthetic been used.

3. Ducuing and Fabre[53] (1934) attributed a death with one of their first eight cases to Evipan Sodium and add "Naturally, we dropped it." The referee accepts their opinion without having had an opportunity to analyze the procedure.

4 and 5. Monod[54] (1934) reported two deaths following the use of Evipan Sodium. He stated that these deaths were not due to the anesthetic, but Desplas, who heard the report, maintained that the drug caused the deaths. Both patients were poor risks, one with pulmonary abscess complicated by meningitis; the other had cirrhosis of the liver. The referee believes that the anesthetic was at least partly responsible for the immediate deaths but that both patients would have died had it not been given. That may be the basis of Monod's contention that the drug was not to blame. One may be permitted to ask why Monod reported them if the drug was not at least partly responsible for the deaths.

6. Napier and Petrie[55] (1934) reported that a man in a very toxic state died with cardiac collapse though "usual precautions were taken." The intended operation was not performed, and this was apparently a case in which the anesthetic caused death; but details are lacking.

7-13. Slot and Galley[56] (1934) reported nine deaths of which they had secured reports. These include one of their own patients, one reported by Westminster Hospital and five others for "some of which they are indebted to Dr. Morrison." It would appear that this Dr. Morrison was the medical representative of the manufacturers, but such is not stated by the authors. The referee believes that two of the nine deaths may be dismissed as being due to other causes. No. 7 of the present series (the first of these authors) was a patient of the authors. A man of 70 was toxic and suffered from chronic bronchitis, fatty myocarditis, cloudy swelling of the heart and kidney, carcinoma of the tongue, edema and congestion of the lung. He received one-third grain of omnopon and 1/150 grain of scopolamine followed after an hour by the injection of 8.5 cc. of Evipan Sodium. Comment is superfluous except to state that the patient survived for sixteen hours. It is an astonishing record for the date.

8. (Reported to Slot and Galley by Westminster Hospital.) Death was almost immediate in an extremely unfavorable case after the injection of 3 cc. The necropsy revealed "a piece of tartar as large as a tooth" lodged in the glottis. It was suggested that it caused death. The referee has studied this report and has concluded that the patient probably died of Evipal Soluble, but certainty is impossible.

9. A man of 67 with renal cardiac diseases and bronchitis received an injection of 7 cc. and died under the anesthetic.

10. A woman of 27 received an injection of 10 cc. of Evipan Sodium for an appendectomy and died during the operation. Such a dose is contraindicated in appendicitis, and the referee believes that it caused the death of the patient.

11. A man of 64 had chronic myocarditis, circulatory failure, edema, hydrothorax and

52. Zantop, H.: Med. Klin., 29:782, 1933.

53. Ducuing, J., and Fabre, P.-Ch.: Bull. et mém. Soc. nat. d. chir., 60:1128, 1934.

54. Monod, R.: Bull. et mém. Soc. nat de chir., 60:318, 1934.

55. Napier, R., and Petrie, P. W. R.: Brit. M. J., 2:534, 1934.

56. Slot, G., and Galley, A. H.: Brit. M. J., 2:201, 1934

a severe toxic oral state; he received an injection of 10 cc. and died "shortly." This is an excessive dose for a man in such a condition, and the cause of death seems obvious.

12. A woman of 50 with advanced cardiac disease and oral sepsis received an injection of Evipan Sodium and died from respiratory and cardiac failure.

13. A woman of 60 with severe rheumatoid arthritis and septic teeth, with extensive myocardial degeneration (shown at necropsy) received an injection of 6 cc. of Evipan Sodium and died at the end of the operation.

14-17. Steinbrüch[57] (1934) reported two deaths and subsequently reported two more. Three of the four are included in the list of fifteen deaths of which reports were collected by Stohr and Niederland. The first of these four (in the referee's list) was that of a woman of 48 whose general condition was poor, in whom there was a diagnosis of phlegmon of the mouth and throat with beginning edema of the glottis. The slow injection of 3 cc. and then of 1 cc. was followed by a sudden change for the worse, cyanosis, superficial respiration, and failure of the pulse. Necropsy revealed also a septic spleen, dilated heart and diseased liver. A less favorable case would be hard to find.

A man of 84 suffering with cancer of the breast received an injection of 7 cc. During a rapid operation, the heart and respiration failed. Restoratives were applied and the patient improved, but he died the next morning. Necropsy showed cancer of the stomach and fatty infiltration of the liver with some pulmonary edema.

A strong, muscular man of 27 suffering with syphilis received an injection of Evipan Sodium for anesthesia for a plastic operation on the palate. There was a pause with the onset of sleep, because of movements, and then a total of 24 cc. (including the first portion) was injected during an operation lasting forty-five minutes. Severe asphyxia was followed in the afternoon by death. Steinbrüch states that this dose seemed justifiable on the basis of previous reports. All these four deaths occurred in 1933, but this report was made in 1934.

A man of 70 received an injection of 13 cc. of Evipan Sodium for an operation for hernia lasting thirty-five minutes. Cyanosis developed while the circulation remained good, but all efforts at restoration failed. After these deaths Steinbrüch stated that they used Evipan Sodium only for short operations, for which they used from 2 to 4 cc. to induce sleep and followed this with ether. It is obvious that Steinbrüch attributes these deaths to the anesthetic.

18. Barnsley[58] (1934) "was moved by the report of Slot and Galley, and because the mortality from Evipan assumes alarming proportions" to report the following death. A man of 70, suffering from dysphagia, was admitted for esophagoscopy; he was frail and cachectic. After the injection of 5 cc. the pulse became thready at once and finally stopped. Necropsy showed that "the stomach was solid with carcinoma." The anesthetic was the immediate cause of death, though the patient would have died shortly without it.

19. Nordentoft[59] (1935) reported that a woman of 64 suffering with cardiac dilatation died about three minutes after the injection of 7 cc. of Evipan Sodium, with respiratory and cardiac failure. Carcinoma of the uterus had been suspected, and the woman, almost paralyzed by fear, had insisted that she would die, even though assured that only a minor operation was to be performed. The nervous condition indicated the use of Evipal Soluble, but the patient was an extremely poor risk for other reasons.

20. Kamniker and Rintelen[60] (1935) reported the death of a man of 70 and that of a woman of the same age. The man died after an interval of three days. The referee does not include this death in the list of twenty-one which is given here. The woman was severely cachectic; she received an injection of 7 cc. of Evipan Sodium, which was fol-

57. Steinbrüch: Zentralbl. f. Chir., **62**:595, 600, 1935.
58. Barnsley, A.: Brit. M. J., **2**:329, 1934.
59. Nordentoft, J.: Zentralbl. f. Chir., **62**:2413, 1935.
60. Kamniker, K., and Rintelen, G.: Deutsche Ztschr. f. Chir., **244**:571, 1935.

lowed after five minutes by failure of the heart and respiration. It seems probable that both patients received morphine, though it is not mentioned in the report. It was used in other cases, and its use seems to have constituted a routine procedure.

21. Greenberger and Bass[38] (1935) reported three deaths following the use of Evipal Soluble in fifty-two procedures. One patient was severely toxic with perineal abscess and severe infection and had a damaged heart. He received an injection of 10 cc. of Evipal Soluble and died within about four minutes from respiratory and cardiac failure. The dose was excessive under the circumstances, and the cause of death seems obvious. Muscular movement induced by the anesthetic contributed to injury of the bladder in one case and thereby probably contributed indirectly to the cause of death in one of the three patients. The third death was apparently due to other causes and does not require further consideration here.

It is obvious that, so long as reports are made without the name of the surgeon or anesthetist in charge, one cannot be absolutely certain that one has avoided duplication in every case. The referee has tried to avoid such duplication, and, on the other hand, he may have omitted some deaths, such as that "reported by a small hospital."

SUMMARY AND CONCLUSIONS

Evipal Soluble (Evipan Sodium) was introduced as a general anesthetic to be injected intravenously before adequate studies had been made of it under a great variety of conditions.

Evipal Soluble probably has a narrow field of usefulness in which it may be employed with relative safety provided it is used with skill and with due regard for its limitations. The contraindications—both relative and absolute—are numerous, but they have not been determined with sufficient precision to permit of the use of the substance with absolute safety in many conditions.

Reports of severe and fatal accidents have been discussed. The referee has examined the readily available data concerning a number of deaths which have followed the use of Evipal Soluble (Evipan Sodium). It is believed that the anesthetic is wholly or partly responsible for forty-three deaths listed in this report, though several of these deaths would have occurred shortly with any anesthetic, and in the absence of any.

It is probable that the preliminary use of morphine contributed to the cause of death in some of these cases. The failure of some operators to report the use of morphine increases the difficulty of analysis of the cause of death. While morphine may have contributed to the cause of death in some cases, as stated, it is equally possible that it lessened the danger in others.

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INCIDENTS OF PRACTICE

Amebic Dysentery: Report of a Case

By FRANZ WILHELM STUMPF,* D.D.S.,
San Antonio, Texas

History and Examination.—J. W., a man, aged 32, American, was referred for an oral and dental examination. The mucous membrane of the mouth appeared healthy, and there were no abnormal conditions clinically. A full-mouth roentgenogram revealed many root tips, abscessed teeth and a cyst. (Fig. 1.) The blood count was as follows: erythrocytes 4,880,000, leukocytes 15,400. The hemogram read: polymorphonuclear neutrophils, 69 per cent; transitionals, 3 per cent; lymphocytes, 25 per cent; large mononuclears, 2 per cent;

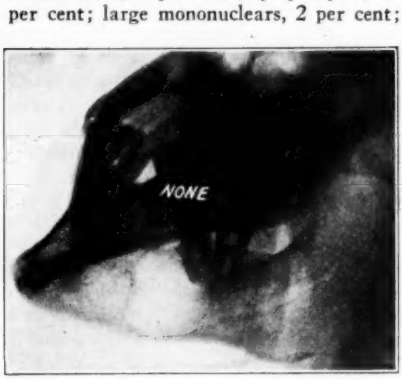


Fig. 1.—Condition of mouth as shown in roentgenogram.

eosinophils, 1 per cent; mast cells and myelocytes, none; hemoglobin, 85 per cent. The Wassermann test was negative.

Comment.—As far as available evidence of scientific value is concerned, there is no reason to believe that *Amoeba histolytica* lives and multiplies in the lumen of the intestine of man and does not invade the tissues. It is held by certain investigators that *Amoeba histolytica,* having invaded the tissues, produces lesions and symptoms in a small percentage of cases. Again, authorities maintain that these organisms live in the lumen of the intestine as harmless commensals in a vast majority of cases.

Operation.—As the resistance of this patient had been lowered materially, the dental foci of infection were eliminated at intervals. The radiculodental cyst was the last to be removed. The usual mucoperiosteal flap was made to afford the accessibility desired. The cyst was enucleated intact (Fig. 2) and suturing done only at the upper borders of the anterior and posterior oblique lines of incision.

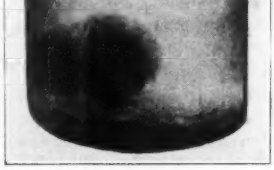


Fig. 2.—Cyst in bottle.

Outcome.—Recovery was rapid after removal of the cyst. The dysentery subsided without further treatment. The patient's weight increased 20 pounds in two months and his mental attitude returned to normal.

Conclusion.—I am inclined to believe that the mandibular cyst so affected the resistance that it was at least a contributing factor in the impaired condition present. This case is of interest since the dysentery was eliminated, the weight was increased and maintained over a long period of time and the patient was mentally and physically rehabilitated.

Medical Arts Building.

(Read at the Texas State Dental Convention, Dallas, Texas, September 4, 1936.)

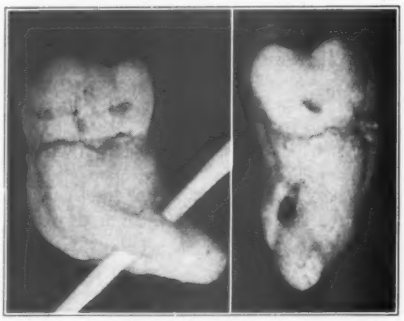
*Chief of the Section on Oral Surgery, Robert B. Green Memorial Hospital, San Antonio, Texas.

Anomaly of Lower Third Molar: Report of a Case

By A. M. LA FLEUR, D.D.S.,
Shawnee, Okla.

A WOMAN, aged 36, was referred by her physician because of neuralgic headaches. July 16, 1936, routine full-mouth intraoral roentgenograms revealed a devitalized first bicuspid and second molar on the lower right side and a devitalized second bicuspid on the lower left. The lower right third molar showed a deep cavity and fused roots with a distinct distal curve. On removal of this tooth, it was found that the roots had fused around the inferior dental canal and that the inferior dental nerve had been severed by the extraction. The accompanying photographs show plainly the peculiar anomaly. A roentgenogram made with the rays directed from the apex toward the occlusal plane might have revealed the condition.

Four months have elapsed since the extraction. The patient is suffering from paroxysmal pains in the right mandible and anesthesia of the lower right lip, with herpes. The neuralgic headaches have not moderated.



Two views of anomalous lower third molar.

American National Bank Building.

PRACTICE IN PARAGRAPHS

This department is intended for busy readers. It aims to tell a vivid story in a few words. Items should be of a practical character, and free from padding—not more than a paragraph or two. We exact no limit, but two hundred words can tell most of these stories. Send in your ideas; they will be welcome.

Case Records in Extractions—Keep a case history of all difficult and unusual extractions; also the tooth or teeth involved. In case of controversy, you will have convincing evidence. Classify them into groups. This little museum will serve you well at times when a particularly difficult case presents itself.—DAVID P. FRUCHTBAUM, Baltimore, Md.

Double-Step Inlays—Take copper band, fit to tooth and clear the bite; lubricate cavity with carbol-eugenol; warm wax and insert in cavity, pressing down with finger. Ask patient to bite hard. Take plate wax of different color and place over tooth and again ask patient to bite hard. Chill with cold water before removing from mouth; remove band and wax; run investment immediately and let set. Remove copper band with sharp knife and carve wax on the model; invest and cast. This method will assure a good-fitting inlay, and one easy to make.—A. P. ELLINGTON, Morehead, Ky.

Removing Casts from Articulator—To make removal of casts from articulator easy, apply soap to base of casts.—HOLLIS J. KNEPP, Philipsburg, Pa.

Removing Compound from Tray—To remove compound, the tray is covered with a light coat of vaseline, warmed over a flame and wiped clean and smooth. The use of paraffin will give the same result.—*Claude A. Moore, Lexington, Miss.*

To Loosen Instruments in Joint—To loosen instruments that are tight in the joint, dipping in aromatic spirits of ammonia is effective. To prevent instruments from rusting in a joint, rust is polished out and mercurial ointment is worked into the joint. This will prevent rusting for a time.—*Claude A. Moore, Lexington, Miss.*

Aid in Establishing Correct Bite—To help establish correct bite, a bar made with wood applicator or a bur is placed across the vault of the upper bite plate and the patient is asked to place the tongue behind this. Protrusion of lower jaw is then impossible. Hotchkiss paper staples are employed for fastening bite plates together. —*Claude A. Moore, Lexington, Miss.*

Drawer for Engine Equipment—In a drawer, three and a half inches deep, in the cabinet, a false bottom a half inch thick is placed. This bottom is perforated with holes half an inch apart of a size to admit all engine equipment such as mandrels and mounted stones. At a glance, the article desired can be found.—*Charles C. Norris, Oshkosh, Wis.*

Cementing Fixed Bridges—In cementing a fixed bridge to place, the excess cement often falls into the embrasure between the pontic and abutment and, after setting thoroughly, is often hard to remove. This is easily prevented by flowing a small amount of soft wax into the embrasure just before cementing the bridge to place. The wax holds out the cement and is easily removed.—GLENN A. GIERE, Washington, D. C.

Reviving "Frozen" Mandrils—Often you will find a mandril with the screw rusted in the head, due to repeated sterilizing. Forcing it will only result in a broken screw. Try this: Soak the rusted head in machine oil for fifteen minutes; then grasp with tweezers and heat in a bunsen flame until the oil has disappeared completely; place the shaft in a vice, gently turning with a screw driver. The screw will loosen easily. Apply more oil.—FRANKLIN W. OTTO, Chicago, Ill.

Protecting Socket and Promoting Clotting After Exraction—After extraction, saliva should not be allowed to enter the socket. The blood should fill the socket and the patient not be allowed to rinse the mouth. When the blood has partially stopped flowing, the gums on both sides of the socket are wiped off and the gums and socket covered with dry foil. This will permit the patient to rinse the mouth and eat without disturbing the clot. The patient is instructed to leave the foil in place as long as it will stay. A very wide-open socket can be protected for forty-eight hours.—*S. M. Lewis, 807 Federal Bank Bldg., Dubuque, Iowa.*

CURRENT LITERATURE

Relation of Hypersensitivity to Localization in and Dissemination of Streptococcus Viridans from Incisor Teeth of Rabbits

By D. WEISBERGER

IN inoculating quantities of *Streptococcus viridans* into normal rabbits, a dosage was determined which resulted in freeing of the blood stream within two hours. In horse-serum sensitized rabbits, it was found not only that the bacteremia was prolonged, but also that significantly higher numbers of bacteria per cubic centimeter of blood were present. Organisms were introduced into the root canal of lower incisors through an extra-oral approach. The findings suggest that only small quantities pass from these foci, the tissues of nine out of ten animals giving no evidence of changes attributable to the organisms. In animals inoculated with *Streptococcus viridans* and with normal saline or horse serum injected into the root canals, the number showing localization in the apical region was greater in sensitized animals. The author concludes that this localization of bacteria is dependent on the number of organism initially inoculated and on the extent of inflammatory reaction in the tissues.—*Yale J. Biol. & Med.*, 9:417, May 1937.

HAMILTON ROBINSON.

Physical Status of Two Hundred and Nineteen Pueblo Indian Children

By ETHEL C. DUNHAM, SOPHIS D. ABERLE, LUCILE FARQUHAR and MICHAEL D'AMICO

A STUDY was made on Indian children ranging in age from seven to eleven years, their heights and weights being compared with those of control groups. The group studied proved shorter and lighter for their age than the other children. The nutritional status, judged by the amount of subcutaneous fat, the musculature and the color of the mucous membranes, was considered "poor" in more than one-third of the children, "fair" in nearly one-half and "good" in only one-sixth. The teeth of the children were examined for the presence of caries, which was found in temporary or permanent teeth in 86 per cent of 216 children examined. Ninety-seven of them had from one to three carious teeth; eighty-nine had four or more. One or more alveolar abscesses were found in the teeth of 12 per cent. Enlarged tonsils or adenoids were found in about one-third of the children. Posture was considered "poor" in 44 per cent and "fair" in 50 per cent. The thyroid gland was enlarged in 15 per cent. The red blood cell counts were below normal in only 17 per cent, but 52 per cent showed polycythemia. In 68 per cent, the white blood cell counts were normal. Trachoma was found in 14 per cent and suspected in an additional 9 per cent. Infection of the skin was present in 10 per cent; syphilis in 2 per cent; infection of respiratory tract in 16 per cent, and calcification of lymph nodes in the chest in 23 per cent. The work is merely intended as preliminary and is to serve as a basis for further study.—*Am. J. Dis. Child.*, 53:739, March 1937.

V. D. CHEYNE.

Incidence of Dental Caries in Seventy-Six Monkeys

By B. G. ANDERSON and S. S. ARNIM

A GROUP of seventy-six *Macaca mulatta* were examined; twenty-five with deciduous, twenty-two with permanent and twenty-nine with mixed dentitions. None of the animals had been intentionally deprived of dietary elements essential to growth, development or maintenance of health. With a mouth mirror and explorer, and with necrosis and débris associated with cavitation as criteria of caries, three animals were found with lesions clinically comparable

to those found in man. These cavities were in a maxillary first permanent molar of one animal; two mandibular first permanent molars of another, and the maxillary first incisors of a third monkey. The histologic pictures were similar to those seen in monkeys. The incidence in this group of monkeys was 3.9 per cent.—*Yale J. Biol & Med.*, 9:443, May 1937.

HAMILTON ROBINSON.

Histologic Study of Ameloblastoma

By H. B. G. ROBINSON

THE ameloblastoma histologically resembles the enamel organ or some degenerated phase of the enamel organ. From a chronologically young solid ameloblastoma which shows cells similiar to the ameloblasts, stratum intermedium and stellate reticulum, the cystic degeneration is traced through to a multilocular cyst. The inability of this tumor to form enamel seems to result from failure of the ameloblast-like cells to excite the young connective tissue to differentiate and form odontoblasts. Before enamel can be laid down, dentin must make its appearance. While no single ameloblastoma has been traced from solid to cystic form, it appears from studies on series of these tumors that such a transition does take place and that solid, cystic and solid and solid forms are not different types, but rather that they are different stages in the degenerative development. Four case histories are cited.—*Arch. Path.*, 22:664, May 1937.

HAMILTON ROBINSON.

Visualization of Salivary Glands Following Use of Opaque Material in the Mouth

By B. W. E. ANSPACH and F. W. GRIFFETH

A ROENTGENOGRAM of the lower part of the face of a patient shows two relatively large spindle-shaped areas of opacity in the submaxillary region, suggesting, by their outline, glandular structures. The mouth secretions were scant and sticky at the time the roentgenograms were taken. The patient gave a history of self-treatment, with home remedies, of the gums around some partially exposed tooth roots. It is not known what these remedies were, although several materials, such as silver nitrate, iodine and ferric chloride, were suggested by the authors. The opaque areas and the faulty secretion disappeared after the home remedies were stopped.—*Am. J. Roentgenol.*, 37:469, April 1937.

GRANT VAN HUYSEN.

Multiple Nature of the Vitamin D of Fish Oils

By CHARLES E. BILLS, O. N. MASSENGALE, MIRIAM IMBODEN and HELEN HALL

THE liver oils of twenty-five species of fish were assayed in comparison with cod-liver oil in rats and chickens. Rat unit for rat unit, some resembled cod-liver oil; several were definitely less effective, and a few more effective than cod-liver oils. The relatively most effective oil was that from the white sea-bass of California. The maximum observed difference in relative effectiveness was about eighteen times. It was concluded that the differences were due to the existence of two or more forms of vitamin D in the oils. The relative effectiveness of irradiated ergosterol was lower than that of any fish oil. The relative effectiveness of irradiated 7-dehydrocholesterol was about the same as that of cod-liver oil or irradiated ordinary cholesterol, but inferior to that of white sea-bass liver oil. Oils of related species differed widely in relative effectiveness.—*J. Nutrition*, 13: 435, April 1937.

V. D. CHEYNE.

Salivary Immunity

CONTRARY to conventional theories of immunity, German workers have found that normal human saliva contains factors that will not only inhibit the multiplication of many species of virulent bacteria *in vitro*, but often kill them in a few hours. Those bacteria not killed by contact with this "normal salivary antiseptic" are almost invariably transformed into avirulent types. For example, Pesch and Damm (*Ztschr. f. Hyg. u. Infectionskr.*, 118:1, 1936) report that although the carbohydrate capsule of type I

and II pneumococci is not demonstrably altered, mouse virulence is almost completely destroyed. Whether or not these "inhibins" are salivary enzymes, epithelial products or antagonistic factors formed or secreted by normal oral flora has not yet been determined, but apparently these factors are not identical with Fleming's lysozyme. The question of salivary imunity presents many problems of clinical interest that should be studied.—Editorial, *J.A.M.A.*, **108**:1264, April 10, 1937.

M. K. HINE.

Potassium Chlorate in Dentifrices

POTASSIUM chlorate has long been used as a constituent of mouth washes, gargles, dentifrices and extemporaneous preparations for oral conditions. One dentifrice widely sold in the United States contains more than 41 per cent of this ingredient. Reports have appeared of deaths occurring when large quantities of such a dentifrice were swallowed, although ordinary daily use of such products does not entail the swallowing of large amounts. Richardson (*J. Pharmacol. & Exper. Therap.*, 60:101, 1937) states that prolonged use of products containing potassium chlorate might result in sufficient absorption of chlorate to produce injurious effects on the blood, kidneys, liver and general health. He found the changes are due to the chlorate ion and not the potassium ion. Even though test animals survived larger amounts of potassium chlorate than is apt to be absorbed, Richardson points out that the traditional use of potassium chlorate in oral preparations lacks a rational or scientific basis. Richardson concludes that inasmuch as a salt action may be obtained with ordinary sodium chloride, potassium chloride has no real place in the cosmetic armamentarium.—Editorial, *J.A.M.A.*, **108**:1343, April 17, 1937.

M. K. HINE.

Results of Dental Root Resection

By W. E. HERBERT

THE author offers a review of the theoretical possibilities of success of dental root resection and refers to reports of satisfactory cases by other workers. Forty-one cases followed for six months to three years are reported and ten series of roentgenograms are shown. Most of these revealed complete regeneration of bone in periods of from four to twelve months. Twelve cases were examined bacteriologically by aerobic and anaerobic methods to determine whether infection existed at the root end. In only one instance were organisms cultivated from a bur which had been passed into the periapical tissues.—*Guy's Hosp. Rep.*, **17**:263, 1937.

B. G. BIBBY.

Salivary Fistula

By DEAN CURTIS

THE embryology and anatomy of the salivary glands are given, pointing out why the parotid is more likely to develop fistulas. A salivary fistula is usually a small opening in the skin, constantly wetting the area by salivary flow, which is increased on stimulation of the salivary gland. A true salivary fistula may be differentiated from a branchial fistula by chemically testing the flow for mucin. In treating the fistulas, operations are designed to transplant the sinus tract into the mouth, cauterization is used or the gland is eliminated entirely.—*Am. J. Surg.*, **36**:122, April 1937.

HAMILTON ROBINSON.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

American Dental Association, Atlantic City, N. J., July 12-16.

American Academy of Periodontology, Atlantic City, N. J., July 8-10.

American Academy of Restorative Dentistry, Atlantic City, N. J., July 10-11.

American Society for the Promotion of Dentistry for Children, Atlantic City, N. J., July 12.

American Society of Oral Surgeons and Exodontists, Atlantic City, N. J., July 9-10.

Association of American Women Dentists, Atlantic City, N. J., July 12-16.

Pan American Odontological Association, Atlantic City, N. J., July 10.

American Society for the Advancement of General Anesthesia in Dentistry, New York City, fourth Monday in March and October.

District of Columbia at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

Greater New York Dental Meeting, New York City, December 6-10.

Australian Dental Congress, Sydney, August 16-20.

International Dental Federation, Stockholm, Sweden, August 9-14.

International Association for Research on Paradontosis, Copenhagen, Denmark, August 16-19.

American Dental Society of Europe, Paris, France, August 2-5.

Montreal (Canada) Dental Club Fall Clinic, September 22-24.

American Dental Assistants Association, Atlantic City, N. J., July 12-16.

American Dental Hygienists Association, Atlantic City, N. J., July 12-16.

STATE SOCIETIES

September

Southern California, at Los Angeles (13-15)

November

Florida, at Hollywood (4-6)
Ohio, at Columbus (8-10)
Puerto Rico, at San Juan

December

Hawaii, at Honolulu

STATE BOARDS OF DENTAL EXAMINERS

Delaware, at Wilmington, July 7-9. Charles R. Jefferis, 709 Medical Arts Bldg., Wilmington, Secretary.

New Jersey, December 6-11. Walter A. Wilson, 148 W. State St., Trenton, Secretary.

North Dakota, at Fargo, July 12-15. W. E. Cole, Bismarck, Secretary.

Pennsylvania, at Philadelphia and Pittsburgh, July 15-19. W. A. McCready, Highland Bldg., Pittsburgh, Secretary.

Dental Corps, U. S. Navy, July 19, Washington, D. C., Great Lakes, Ill., and San Diego, Calif. Surgeon General, U. S. Navy, Washington, D. C.

BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY OF NEW JERSEY

The State Board of Registration and Examination in Dentistry of New Jersey will hold its annual examinations, commencing Monday, December 6 and continuing for five days thereafter. On application to the secretary a copy of the requirements and rules, instruction sheet and preliminary application blank will be sent. Any person desiring to apply as a candidate must file

the preliminary application, together with the examination fee of $25, on or before March 15 for the succeeding June examinations or before September 1 for the succeeding December examinations.

WALTER A. WILSON, *Secretary,*
148 West State St.,
Trenton.

PAN AMERICAN ODONTOLOGICAL ASSOCIATION

There will be a conference of the Pan American Odontological Association, Saturday, July 10, at 4:00 o'clock in the Rose Room, Chelsea Hotel, Atlantic City, N. J. The aims of this association are to foster a close professional and cultural interchange between the members of the dental profession in the United States and those of the other countries of the Americas. All members of the dental profession are cordially invited.

RALPH HOWARD BRODSKY, *Chairman,*
New York Section,
205 West Fifty-Seventh St.,
New York City.

INTERNATIONAL DENTAL FEDERATION

The thirty-first session of the International Dental Federation will be held in Stockholm, August 9-14. The Hotel Gillet will be headquarters for all transactions, including scientific meetings and business meetings, and an informal reception on the opening day. A reception and dinner-dance will be given by the City of Stockholm at the City Hall, August 11, a banquet at the Hasselbacken, August 13, and an excursion, with dinner will be given by the Stockholm Dental Society and the Dental Federation of Sweden, August 14. As Stockholm is crowded in August, it is suggested that those planning to attend write at once to the secretary of the local committee, Dr. T. Wognsen, 44 Skeppsbron, Stockholm, for accommodations.

CHARLES F. L. NORD, *Secretary General,*
1 Scheveningscheweg,
The Hague,
Holland.

INTERNATIONAL ASSOCIATION FOR RESEARCH ON PARADONTOSIS

The sixth congress of the International Association for Research on Paradontosis will be held in Copenhagen, August 16-19. The American representative of the association is Hermann Becks, Second and Parnassus Ave., San Francisco, Calif., who will furnish further information.

OVE BRINCH, *Secretary General,*
Bregade 45 A,
Copenhagen, Denmark.

UNITED STATES PATENTS APPLICABLE OR PERTAINING TO DENTISTRY

ISSUED DURING MAY 1937

May 4

No. 2,079,373, to HENRY JORDAN. Device for Reading X-Ray Films.

May 11

No. 2,079,728, to HAROLD G. ARNOLD. Tooth Brush Massager.

May 18

No. 2,080,605, to HAROLD PLAMER DUEY. Toothbrush.

No. 2,081,087, to ROBERT GALLOWAY. Denture.

May 25

No. 2,081,392, to ENRIQUE G. TOUCEDA. Denture.

No. 2,081,558, to CHARLES H. PRANGE. Casting Investment Material and Process.

No. 2,081,792, to HARILAOS D. CASSANOS and DEMETRIOS H. CASSANOS. Pocket Tooth Brush.

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